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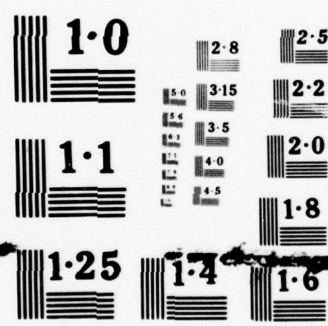
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NAVAL POSTGRADUATE SCHOOL
Monterey, California

THESIS

ADAPTATION OF THE IMPROVED ANTIAIRCRAFT ARTILLERY SIMULATION COMPUTER PROGRAM (P001) FOR USE AT THE NAVAL POSTGRADUATE SCHOOL IN AIRCRAFT COMBAT SURVIVABILITY STUDIES

by

Carl Frederick Swenson

March 1978

Thesis Advisor: R. E. Ball

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The Air Force Armament Laboratory Antiaircraft Artillery Simulation Computer Program (P001), as modified by Calspan Corporation, was adapted for use on the Naval Postgraduate School IBM 360/65 computer and a preprocessor program (PIP) for P001 was written to facilitate data input to P001 and to complement the P001 output.

The modifications required to convert the Calspan modified P001 from a Control Data Corporation computer program to an

NPS IBM 360/65 computer program are described herein. In addition, aircraft characteristics and P001 scenario assumptions, as well as the various P001 Input Program (PIP) options and capabilities, are discussed.

A complete P001/PIP package and user's guide for an aircraft attrition study in the NPS Course AE 3251, Aircraft Combat Survivability, are presented.

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by

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The Air Force Armament Laboratory Antiaircraft Artillery Simulation Computer Program (P001), as modified by Calspan Corporation, was adapted for use on the Naval Postgraduate School IBM 360/65 computer and a preprocessor program (PIP) for P001 was written to facilitate data input to P001 and to complement the P001 output.

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A complete P001/PIP package and user's guide for an aircraft attrition study in the NPS Course AE 3251, Aircraft Combat Survivability, are presented.

TABLE OF CONTENTS

I. INTRODUCTION

The Air Force Armament Laboratory (AFATL) has developed an antiaircraft artillery (AAA) simulation computer program called P001 which is the present standard program for conducting survivability assessments of aircraft in a hostile AAA environment. P001 is used throughout the aircraft industry and is the aircraft attrition program required by the Department of the Navy MIL-STANDARD-2072(AS), SURVIVABILITY, AIRCRAFT; ESTABLISHMENT AND CONDUCT OF PROGRAMS FOR, August 1977.

Briefly, P001 computes the probability of kill of a target aircraft flying a user-input flight path, as a result of its being fired upon by user-selected antiaircraft artillery located at user-input locations. The technique used by P001 to accomplish this task involves:

- Computation of an aim point with consideration of the errors that can arise therein.
- Simulation of the firing process and the sources of error in the firing process.
- Combination of all the effects of random error into one total projectile trajectory distribution.
- Location of the user-input vulnerable area of the aircraft within the total trajectory distribution.
- Computation of the probability of kill.

P001 has been used in NPS Course AE 3251, Aircraft Combat Survivability, to illustrate the interaction of the various

elements that comprise the aircraft combat survivability problem in a hostile AAA environment. The scenario consists of a typical Naval aircraft on an attack mission. The aircraft's target is the bridge shown in Fig. 1. The student must select a flight path to the target and also the location of the defending AAA. P001 is used to determine the probability of survival of the aircraft.

Use of P001 as an educational tool in aircraft combat survivability studies is very effective since it requires a knowledge of the techniques for calculating aircraft vulnerable areas, as well as the basics of the interaction between the threat, the environment and the target aircraft. Some of the interaction parameters include aircraft vulnerable area, speed, altitude, location and aspect angle with respect to the threat, and aircraft maneuver characteristics; the effect of terrain, target altitude and range on projectile performance; and the antiaircraft artillery threat envelope.

The input to P001 requires many time consuming, tedious computations and a significant amount of keypunching, a use of time that does not profitably contribute to the aircraft combat survivability learning experience. In addition, the realism of the input data has a significant effect on the validity of the result and, up to now, it has not been possible to evaluate input data accuracy. Consequently, a preprocessor computer program that would significantly reduce the time required for a student to prepare the input data, as well as provide an indication as to the realism of the input data, is very desirable.

AE 3251
CLASS PROBLEM SCENARIO

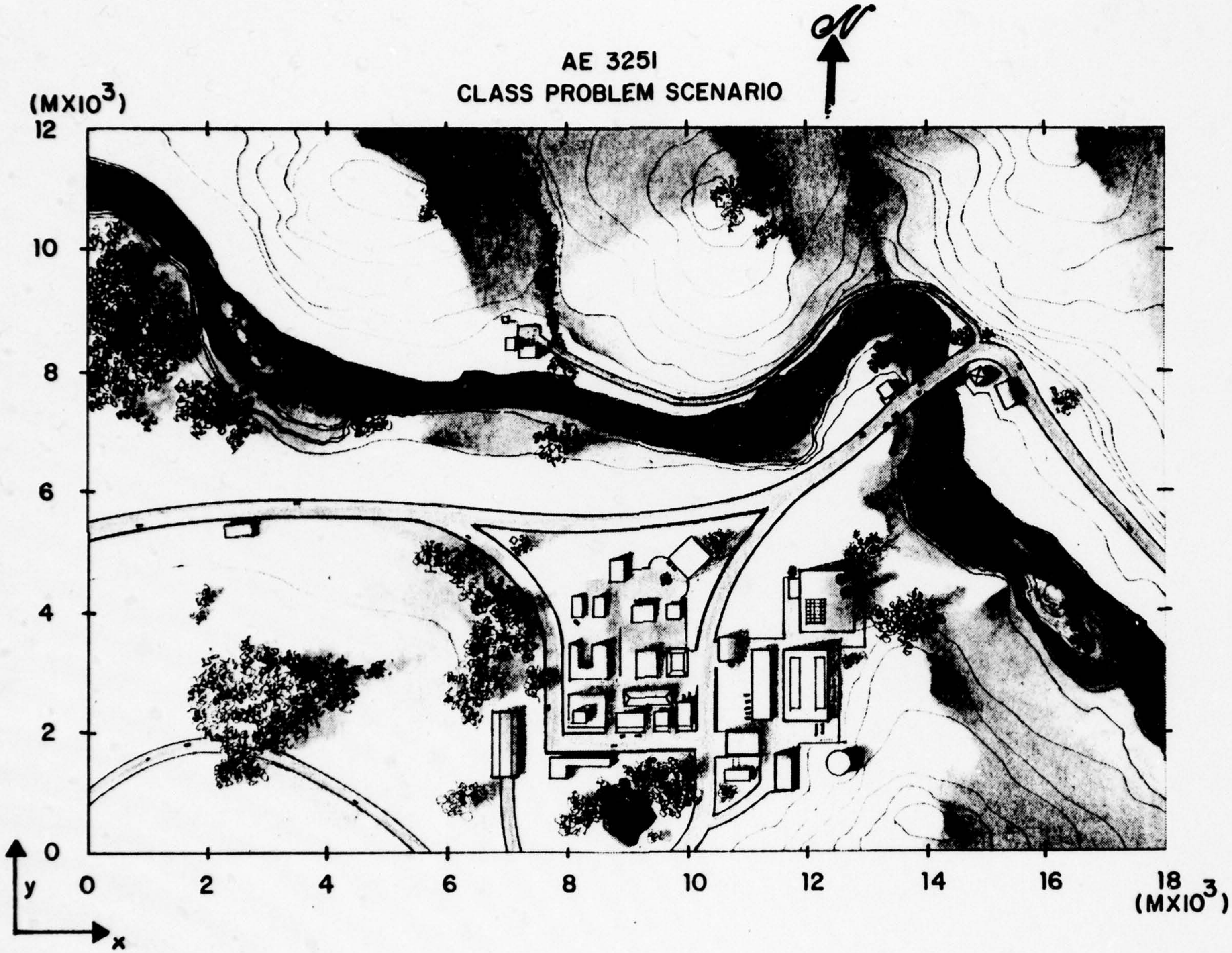

Figure 1

While the preprocessor program was being developed for P001, a version of P001 that was significantly modified by Calspan was obtained from the Air Force Flight Dynamics Laboratory. This improved version of P001 is capable of including the effects of self-contained airborne electronic countermeasures (ECM) on the acquisition/tracking process, of detection system anti-jam capabilities, and of radar beam multipath characteristics. The output of P001 was also expanded. The improved P001 was written for a Control Data Corporation computer system.

The problem solved by this thesis effort is two-fold:

- The adaptation of the improved P001 to the NPS IBM 360/65.
- The development of a P001 input program (PIP) to reduce student time required to prepare the input data required by P001 and to provide an indication of the realism of the input data.

The main body of this thesis describes the adaptation of the improved P001 to the IBM 360/65 and the details of the development of PIP. Appendix A contains a complete package for a problem in aircraft attrition to be used in AE 3251.

The following sources were heavily relied upon for information throughout the entire thesis development process:

- Antiaircraft Artillery Simulation Computer Program — AFATL Program P001 Vol. I User Manual, Air Force Armament Laboratory, Eglin AFB, Florida (Joint Aircraft Attrition Program Advanced Planning Group, September 1973).

– Antiaircraft Artillery Simulation Computer Program – Program P001 Program Update, Joint Technical Coordinating Group for Aircraft Survivability (Survivability Assessment Subgroup, April 1976).

– M. E. Ramaccia, ATS Working Paper No. 9, Calspan Modification to Antiaircraft Artillery Simulation, AFATL Program P001 (Calspan Corporation, Buffalo, New York, 11 August 1977).

– G. Gary Maxwell, The Development of Class Problems for a Course in Aircraft Combat Survivability (Naval Postgraduate School Master's Thesis, 1978).

II. APPROACH

A. ADAPTATION OF THE IMPROVED P001 TO THE NPS IBM 360/65

The adaptation of P001 from a CDC computer to the NPS IBM computer involved several hundred computer-unique alterations; that is, changes that had to be made due to the inherent differences between the CDC and IBM computer systems. These changes involved:

– Elimination of the FTNBIN, SECOND, TIMREM and DATE subroutines contained in the CDC system, but not available on the IBM 360 system.

– Substitution of the IBM "REREAD" command for the CDC "DECODE" function.

– Substitution of the IBM "A4" format field descriptor for the CDC "A10" descriptor.

– Substitution of the IBM "'" format delimiter for the CDC "*" delimiter.

– Substitution of IBM-NPS job control language (JCL) cards to accomplish the required input, output, tape usage and core size requirements.

– Extensive reconstruction of the P001 main program by creating the subroutine TOOBIG using the input, output and exits sections of the P001 main program. This permitted a scalar map size small enough for the IBM system to compile and thus avoided the "ROLL SIZE EXCEEDED" error given by the NPS compiler.

B. DEVELOPMENT OF A PREPROCESSOR FOR P001 (PIP)

In the early stages of AE 3251 it is not desirable for the student to become heavily involved in the many and various facets and options of the P001 program. For this reason, a simple preprocessor computer program to P001 that will provide punched cards for all of the input in the proper format, requiring only a minimum of student involvement, has been developed. For example, the Calspan-modified P001 program requires an input of 196 cards with over 1,400 entries and 860 calculations for a 50 milestone flight scenario involving 7 ground weapons of 4 threat classes. On the other hand, PIP requires an input of 59 cards with 160 entries and no calculations for the same 50 milestone flight scenario and automatically punches the output that fulfills all P001 input requirements in the proper format and order. This significantly reduces the student involvement in the input process.

PIP requires only that the student provide the X, Y and Z coordinates of each of the aircraft flight path milestones as input data, avoiding the many tedious calculations required by full P001 input. In addition, the preprocessor checks the flight path to determine if it exceeds any aircraft performance limits or scenario guidelines. The aircraft built into PIP has performance characteristics approximating those of the A-7 Corsair. The cruise velocity, climb/dive schedules, acceleration/deceleration schedules, dirty/clean velocity limitations, stall velocity and "G" loading limitation values are only representative quantities and are not intended to

accurately describe the performance characteristics of an actual A-7 since the intent of PIP is only to provide representative flight characteristics that demonstrate the principles of aircraft combat survivability in an AAA scenario.

C. FLIGHT PATH PREPROCESSING

1. FORTRAN Distance Equations

The three cartesian milestone distance components, DX, DY and DZ, are calculated in PIP by taking the difference between the X, Y and Z components of adjacent milestone locations.

Milestone distance component FORTRAN equations:

```
DX = X(I+1) - X(I)
DY = Y(I+1) - Y(I)
DZ = Z(I+1) - Z(I)
```

where,

I = ith milestone

X = milestone x-coordinate location

Y = milestone y-coordinate location

Z = milestone z-coordinate location

DX = milestone x-coordinate distance difference

DY = milestone y-coordinate distance difference

DZ = milestone z-coordinate distance difference.

2. Milestone Distance Equations

The distance between successive milestones is the square root of the sum of the squares of the milestone distance components.

Milestone distance FORTRAN equations:

```
 DX2 = DX**2
 DY2 = DY**2
 DZ2 = DZ**2
DIST = SQRT(DX2 + DY2 + DZ2)
```

where,

DIST = milestone distance

3. <u>Heading and Climb Angle Equations</u>

The aircraft heading and climb angle between milestones are calculated in PIP using standard geometrical considerations based on the relative locations of the X, Y and Z coordinates of adjacent flight path milestones.

Aircraft heading FORTRAN equation:

```
HDG(I+1) = ATAN2(DY,DX)
```

where,

HDG = aircraft heading

Aircraft climb angle FORTRAN equation:

```
CA(I) = ATAN2(DZ,SQRT(DX2 + DY2))
```

where,

CA = aircraft climb angle

4. <u>Aircraft Speed Equations</u>

The aircraft is assigned a cruise speed of between 206 and 257 meters per second (400 and 500 knots, respectively) at milestone 1 by the user. Aircraft speed at successive locations is calculated based on the altitude change between milestones, since an increase/decrease in altitude decreases/increases aircraft speed proportionately, and from a schedule

based on the present aircraft speed as compared with the initially assigned cruise speed. If the aircraft speed is found to be less/more than the assigned cruise speed, a slow acceleration/deceleration to the assigned cruise speed is assumed. The X, Y and Z components of the velocity at each milestone are then calculated based on the heading and climb angle at the milestone.

Aircraft velocity FORTRAN equations:

```
VEL(1) = CVEL
VEL(I+1) = VEL(I) - TAN(CA(I))*DIST/100
              + (CVEL - VEL(I))*( DIST/VEL(I))/30
VAVG = (VEL(I) + VEL(I+1))/2
```

where,

CVEL = aircraft cruise speed

VEL = aircraft velocity

VAVG = average aircraft velocity

Aircraft velocity component FORTRAN equations:

```
XYVEL = VEL(I)*COS(CA(I))
XDOT(I) = XYVEL*COS(HDG(I))
YDOT(I) = XYVEL*SIN(HDG(I))
ZDOT(I) = VEL(I)*SIN(CA(I))
```

where,

XYVEL = horizontal velocity component

XDOT = x-coordinate velocity component

YDOT = y-coordinate velocity component

ZDOT = z-coordinate velocity component.

5. <u>Flight Time Equations</u>

The time interval between flight path milestones is calculated by dividing the distance between the milestones by the average velocity between the milestones. The individual milestone time intervals are summed to provide the total time for the scenario.

Flight time FORTRAN equations:

```
T(I+1) = T(I) + DIST/VAVG
DT(I)  = T(I) - T(I-1)
```

where,

T = flight time (cumulative)

DT= flight time between milestones (I) and (I+1)

6. <u>Turn Rate, Roll Angle, "G" Loading</u>

The turn rate required between milestones is calculated from the heading change and the time interval between the milestones. This turn rate and the aircraft speed are used to calculate the "G" loading on the aircraft caused by the turn. The roll angle required for a level turn is calculated from the turn rate and the aircraft speed.

Turn angle FORTRAN equation:

```
TNANG - HDG(I+1) - HDG(I)
```

where,

TNANG = milestone turn angle.

Turn rate FORTRAN equation:

```
TNRT(I) = TNANG/DT(I)
```

where,

TNRT = milestone turn rate.

Roll angle FORTRAN equation:

```
RA(I) = ATAN(TNRT(I)*VAVG/9.81)
```

where,

RA = milestone aircraft roll angle.

"G" loading FORTRAN equations:

```
ABSRT(I) = ABS(TNRT(I))
G(I) = SQRT(ABSRT(I)**2*VEL(I)**2/9.81**2 + 1)
```

where,

ABSRT = absolute value of turn rate

G = "G" loading

7. <u>P001 Stored Time Increments</u>

The equal time increments between successive "P001 stored" positions along the flight path (not milestones) is equal to the total scenario flight time (T) divided by 1000. This time increment is required in the P001 input data card 02.

8. <u>Probability of Kill Accumulation Periods</u>

The total scenario flight time (T) is divided into ten equal time segments in which the probability of kill will be computed for each segment. These ten increments are required on P001 input card 06.

The values computed above are printed and punched on cards that can be used as part of the P001 input data. All data are punched in the specified order to be input to the P001 program.

D. AIRCRAFT PERFORMANCE LIMITATIONS,
FLIGHT PATH REQUIREMENTS AND ERROR MESSAGES

PIP provides several checks on the performance requirements of the aircraft as it traverses the user-input flight path. It also checks the bombing run portion of the flight path to see if it satisfies the requirements for successful bomb drop. These checks are as follows:

1. Cruise Speed

The aircraft cruise speed is initially input by the user at a value between 206 and 257 meters per second and is changed as dictated by altitude changes and the acceleration/deceleration schedule presented in II.C. If the aircraft is assigned a cruise speed outside of the range from 206 to 257 meters per second, the following cruise speed error message is generated:

Error message: "CRUISE SPEED IS _____ METERS PER SECOND WHICH IS NOT WITHIN THE GIVEN LIMITS OF BETWEEN 206 AND 257 METERS PER SECOND."

2. Stall Speed

If the aircraft speed falls below 90 meters per second (175 knots), the following stall error message is generated, identifying the error, the milestone and the velocity value causing the error message:

Error message: "MILESTONE ___ VELOCITY IS ____ METERS PER SECOND. STALL OCCURS AT 90 METERS PER SECOND. DECREASE THE CLIMB ANGLE PRIOR TO MILESTONE ___."

3. "Red Line"

Prior to the bomb release point, the aircraft is "drag limited" to 260 meters per second (500 knots). After ordnance release, the drag limitation eases to permit a speed of 310 meters per second (600 knots).

4. "G" Loading

If the maximum "G" loading of 6 is exceeded, the following turn rate error message is generated, identifying the error, the milestone, the "G" loading and turn rate that caused the error message and denoting the corrective turn angle which will eliminate the error:

Error message: "MILESTONE ___ TURN RESULTS IN A TURN RATE OF ____ DEGREES PER SECOND WHICH RESULTS IN A G LOADING OF _____ WHICH IS IN EXCESS OF THE 6 G MAX LOADING. DECREASE THE TURN ANGLE AT MILESTONE ___ TO BELOW ____ DEGREES."

5. Minimum Altitude

If the aircraft descends to an altitude less than 61 meters prior to bomb release, the following error message is generated identifying the error, the milestone and the milestone altitude that caused the error:

Error message: "ALTITUDE AT MILESTONE ___ IS ____ METERS WHICH IS BELOW THE MIN ALT OF 61 METERS."

6. Maximum Altitude

If the aircraft attains an altitude greater than 457 meters prior to the "pop-up" maneuver, the following error message is generated identifying the error, the milestone and the milestone altitude that caused the error:

Error message: "ALTITUDE AT MILESTONE ___ IS ____ METERS WHICH IS ABOVE THE MAX ALT PRIOR TO POP UP OF 457 METERS."

7. <u>Overall Maximum Altitude</u>

If, at any time, the aircraft exceeds the overall maximum altitude of 2134 meters, the following error message is generated identifying the error, the milestone and the milestone altitude that caused the error:

Error message: "ALTITUDE AT MILESTONE ___ IS ____ METERS WHICH IS ABOVE THE MAX ALT OF 2134 METERS."

8. <u>Minimum "pop up" Altitude</u>

If, during the "pop up" maneuver, the aircraft fails to attain a minimum altitude of 1219 meters, the following error message is generated identifying the error and the altitude attained during the "pop up" maneuver:

Error message: "MAX ALTITUDE DURING POP UP WAS ____ METERS WHICH IS LESS THAN THE MINIMUM POP UP ALTITUDE OF 1219 METERS."

9. <u>Bomb Release Heading</u>

If the aircraft heading at the time of bomb release is greater than 5 degrees from the true heading to the target, the following error message is generated identifying the error, the aircraft heading and the true heading to the target at the time of bomb release:

Error message: "THE AIRCRAFT HEADING INTO THE BOMB RELEASE POINT IS _____. THE HEADING TO THE TARGET IS ____.

THE HEADING DIFFERENCE IS _____ WHICH IS GREATER THAN THE 5 DEGREE MAXIMUM DIFFERENCE LIMIT."

10. Target Acquisition Time

If the aircraft does not hold a heading of less than 5 degrees from the true heading to the target for a time period of at least 2 seconds on the leg immediately prior to the bomb release point, the following error message is generated identifying the error and the time duration of the leg that caused the error:

Error message: "THE LENGTH OF THE LEG IMMEDIATELY PRIOR TO THE BOMB RELEASE POINT IS ___SECONDS IN DURATION WHICH IS LESS THAN THE MINIMUM OF 2 SECONDS."

11. Bomb Release Altitude

If the ordnance is released outside of an altitude envelope of from 305 to 914 meters, the following error message is generated identifying the error and the altitude at bomb release:

Error message: "THE BOMB RELEASE ALTITUDE IS ____ METERS WHICH IS NOT IN THE BOMB RELEASE ALTITUDE RANGE OF BETWEEN 305 TO 914 METERS."

12. Bomb Release Range

If the ordnance is released at a distance greater than 1000 meters from the target, the following error message is generated identifying the error and the distance from the target at the time of bomb release:

Error message: "THE BOMB WAS RELEASED AT A DISTANCE OF ____ METERS FROM THE TARGET WHICH IS IN EXCESS OF THE 1000 METER MAXIMUM BOMB RELEASE RANGE."

13. Gun Location Input Error

If the option is chosen to input the gun locations, but no gun location information is part of the input data or not all of the gun locations are specified, the following error message is generated identifying the error. Program execution terminates after the error message is printed.

Error message: "GUN EMPLACEMENT DATA WAS SPECIFIED AS PART OF THE INPUT DATA; HOWEVER, EITHER NO GUN EMPLACEMENT DATA IS PART OF THE INPUT OR ALL SIX GUN LOCATIONS WERE NOT SPECIFIED. EXECUTION TERMINATES."

14. Anti-jam Error

If the anti-jam option is specified, but no jammer is in operation, the following error message will be generated and the anti-jam function will be "turned off":

Error message: "THE ANTI-JAM FUNCTION IS SPECIFIED; HOWEVER, THE JAM FUNCTION IS NOT SPECIFIED. THE ANTI-JAM FEATURE HAS BEEN TURNED OFF."

15. Type 3 Gun Range Error

If a type 3 weapon is located within 3,000 meters of the center of the bridge, the following error message will be generated, identifying the error, the position of the gun that caused the error and the actual distance from the target of the gun:

Error message: "GUN TYPE 3 LOCATED AT X:____ Y:____ IS ____ METERS FROM THE TARGET WHICH IS LESS THAN THE MINIMUM DISTANCE OF 3000 METERS."

16. Zero Power Jammer Error

If the jamming function has been specified, but the jammer has been assigned a power of zero, the jammer function is "turned off" and the following error message is generated, icentifying the error and the fact that the jammer has been "turned off":

Error message: "THE JAM FUNCTION IS SPECIFIED, BUT THE JAMMER POWER IS SPECIFIED AS ZERO. THE JAM FUNCTION HAS BEEN TURNED OFF."

17. Maximum Power Jammer Error

If the jammer has been assigned a power greater than 1000 watts, the following error message is generated, identifying the error. The jammer power will then be limited to 1000 watts.

Error message: "THE SPECIFIED JAMMER POWER IS GREATER THAN 1000 WATTS AND HAS BEEN LIMITED TO 1000 WATTS."

E. PROGRAM OPTIONS

PIP provides the following electronic warfare options.

1. Jamming Option

An airborne jammer aboard the target aircraft is utilized to degrade radar acquisition/tracking capabilities.

2. Anti-jam Option

Ground weapons that have an anti-jam capability use it to partially nullify the effects of the airborne jammer.

3. Multipath Option

The performance of all radar units which are susceptible to multipath effects is appropriately degraded.

PIP also provides for any combination of the following input/output options:

4. List the P001 Input Deck

A complete listing of all required cards for input to the P001 program is provided. The green "JOB" card and the orange final "EOF" card are not part of this listing. These two cards are the only cards that must be provided by the student to run the P001 program with the PIP output.

5. Punch the P001 Input Deck

A complete punched input deck in the proper format and order to run P001 is provided by this option. Again, no "JOB" or "EOF" card is provided.

6. Plot the P001 Scenario

A plot of the basic geographical features of the scenario, the aircraft flight path and milestone locations, the bomb release point, the gun emplacement locations and the threat radius for each weapon (coded as to weapon type) are provided by this option. Fig. 2 shows a typical PIP scenario plot.

7. Extended Printout Option

An extended printout of the results of the P001 analysis will be provided as output.

8. Gun Location Option

The locations of six of the seven guns in the scenario may be input to the program or preset gun locations may be utilized, as desired.

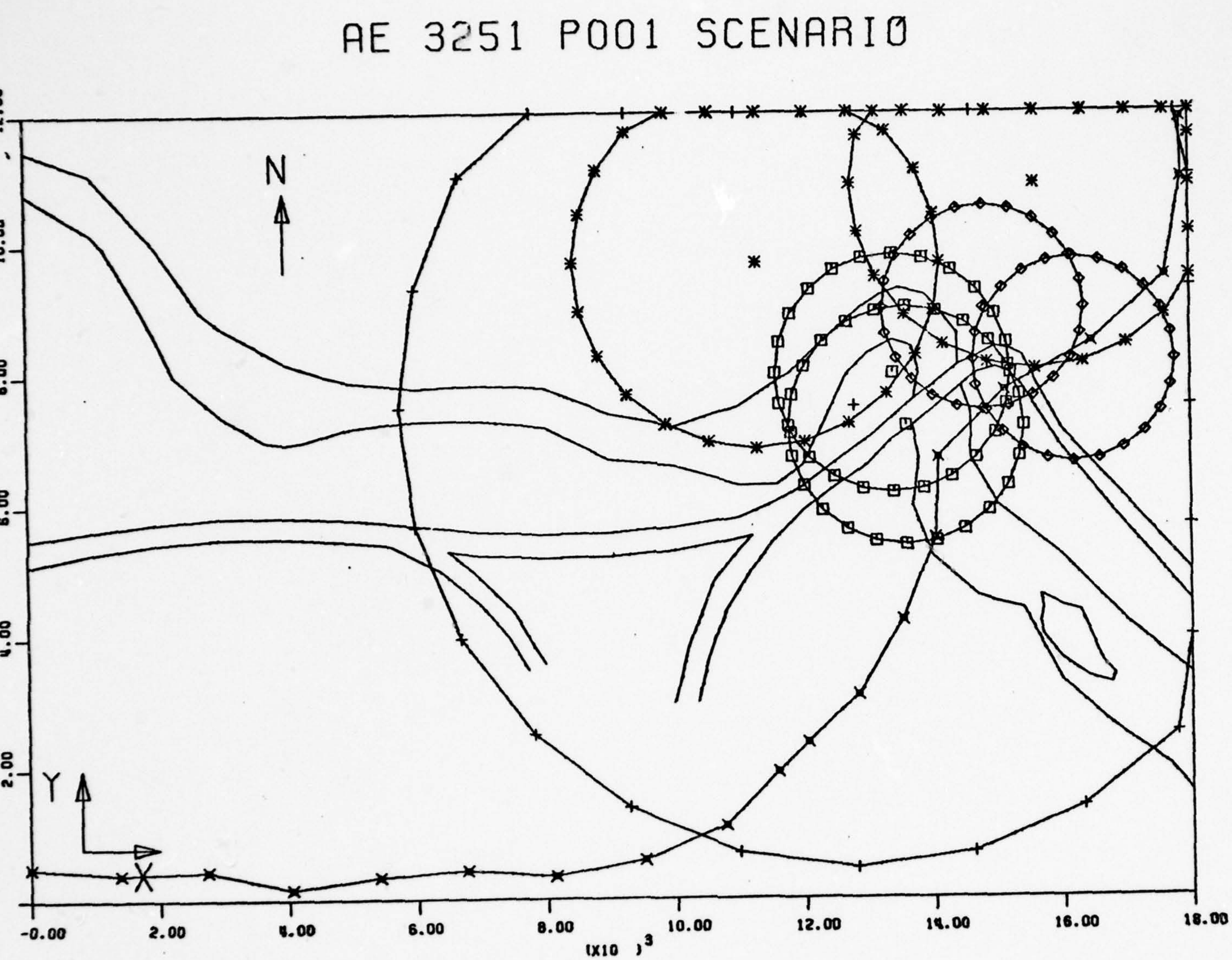

Figure 2 Typical PIP Scenario Plot

In all cases, messages are generated specifying which options were or were not chosen for each execution of PIP.

F. PIP INPUT DATA DEFAULT VALUES

In order to significantly reduce student involvement in the P001 input process, PIP assigns predetermined values to many of the options available under the full P001 input. These default values, over which the student has little or no control, were chosen to provide values that are representative of the typical attack situation simulated by the class problem scenario. The following is a list of these default values as they pertain to each P001 input card:

<u>01 Card</u>: Output Header Information

The output header information is assigned "Aircraft Combat Survivability Scenario" by PIP.

<u>02 Card</u>: Initial Flight Path Data

JMODE = 0: The milestone data are read from cards for one milestone at a time.

KMODE = 12: Flight path stored position data will be printed at every 12th position along the flight path.

TMIN = 0: The time at the beginning of the flight path is assigned a value of zero.

TMAX: The time at the end of the flight path is computed by PIP.

DTFPA: The time increment between successive stored positions along the flight path is calculated by PIP as TMAX/1000.

XR, YR = 0: An x, y reference location in the Flight Path Coordinate System. XR and YR are coordinates in the Flight Path Coordinate System of the point located at XT, YT and ZT in the General Reference Coordinate System, as shown in Fig. 3.

XT, YT = 0: The x, y coordinates in the General Reference Coordinate System of the point located at XR, YR in the Flight Path Coordinate System, as shown in Fig. 3.[1]

PSI = 0: The rotational angle required to rotate the Flight Path Coordinate System into the General Reference Coordinate System (positive for counter-clockwise rotation).

ZT = 0: Vertical correction factor to be added to each point of the flight path, as shown in Fig. 3.[1]

2A Card: Flight Path Milestone Input

All data on Card 2A is calculated by PIP based on the cruise speed and milestone coordinates provided by student input.

03 Card: Ground Weapon Complex Coordinates

If the preset weapon location option is chosen, the seven ground weapons used in the class scenario are assigned in the following locations by PIP:

---

[1] Setting XR, YR, XT, YT, ZT and PSI equal to zero results in the coincidence of the Flight Path Coordinate System and the General Reference Coordinate System.

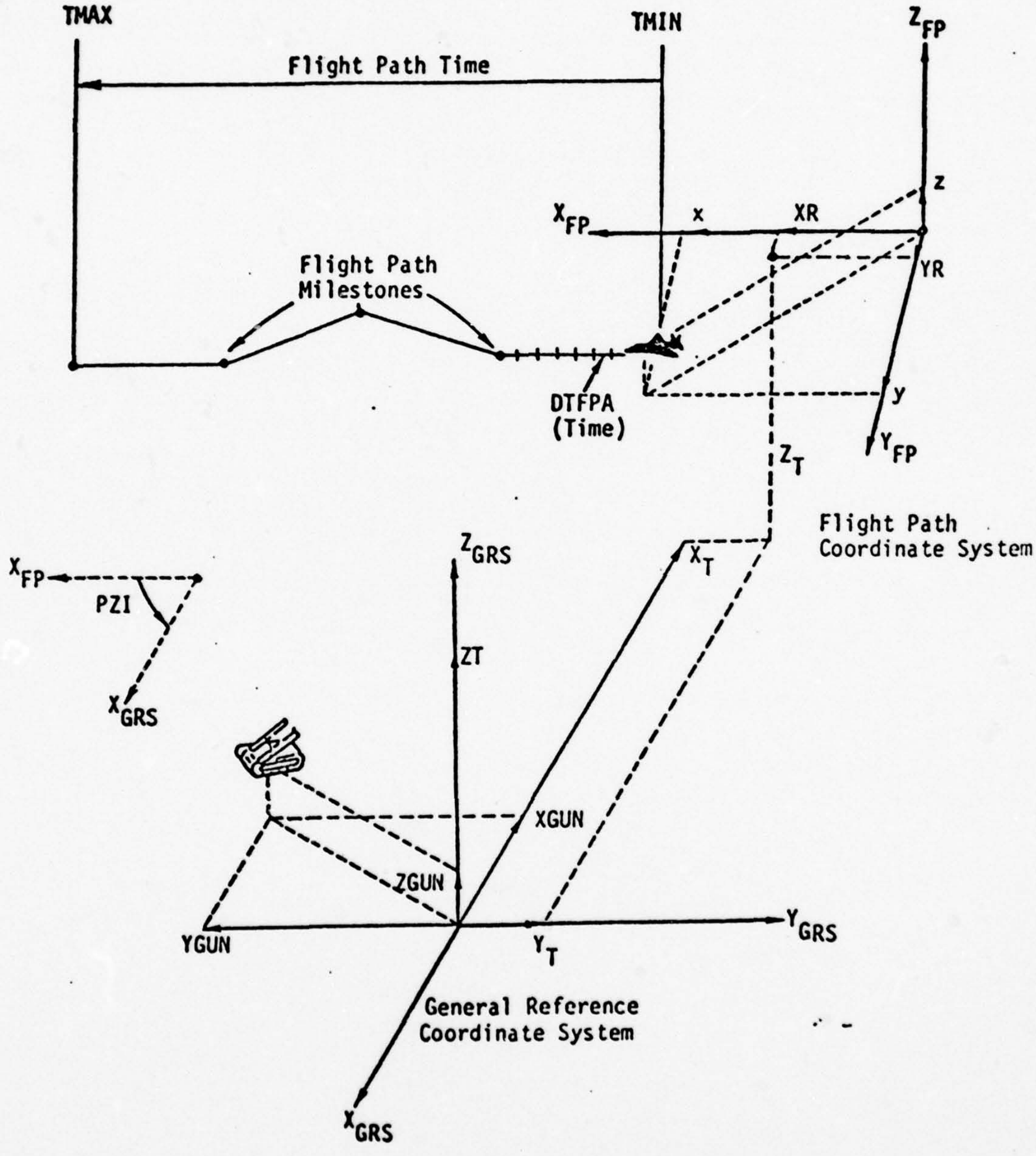

Figure 3 **Relationship of the General Reference and Flight Path Coordinate Systems**

Gun	XGUN	YGUN	ZGUN
1	14,800	9,000	40
2	16,200	8,200	40
3	13,600	7,200	20
4	13,400	8,000	20
5	11,300	9,700	50
6	15,600	10,900	90
7	12,800	7,500	20

where XGUN, YGUN and ZGUN are as shown in Fig. 3. Fig. 2 shows the weapon locations.

If the preset weapon location option is not chosen, all values on Card 03 are assigned by student input.

04 Card: Ground Weapon Characteristics

Each ground weapon is defined by six parameters. These parameters are:

IGT: Ground weapon type.

IEM: Fire control operation mode.

ICB: Number of barrels of the ground weapon to be fired in a simultaneous manner, where ICB x ISB is the number of barrels per weapon.

IGL: Number of ground weapons located in the ground weapon complex. (ICB x ISB x IGL is the number of barrels at one location.)

CIRCLE: Radius of the circle of the ground weapon complex. If there is only weapon in the ground weapon complex, CIRCLE = 0.0.

The default values selected for the six parameters for each of the seven weapons are as follows:

	IGT	IEM	ICB	ISB	IGL	CIRCLE
Gun 1:	1	1	1	1	1	0.0
Gun 2:	1	1	1	1	1	0.0
Gun 3:	2	1	1	1	1	0.0
Gun 4:	2	1	1	1	1	0.0
Gun 5:	3	4	4	1	1	0.0
Gun 6:	3	3	4	1	1	0.0
Gun 7:	5	3	2	1	1	0.0

05 Card: Ground Weapon Complex Density Factors

IF5 = 0: Ground weapon complex density factors are not printed.

NRHOS = 1: The number of ground weapon density factors equals one.

RHO(1) = 1.0; RHO(2) through RHO(9) = 0.0: Generally, RHO = (number of possible ground weapon complexes in the engagement divided by the number of possible ground weapon complex locations in the scenario).

06 Card: Flight Path P_k Accrual Time Intervals (P_k = probability of kill)

IF6 = 1: Flight path P_k accrual time intervals are printed.

NTINTS = 9: One less than the total number of flight path time intervals to be considered. P001 adds one additional time interval for P_k's accumulated from NTINTS to infinity.

TINTER(1) through TINTER(9): TINTER values are assigned by PIP. Each TINTER is an increment representing 1/10th of the total flight path time.

07 Card: Aircraft Vulnerable Area Table Title

ICARD = a. "Vulnerable Area Table vs Type 1 and 2 Weapons",

b. "Vulnerable Area Table vs Type 3 Weapons",

c. "Vulnerable Area Table vs Type 5 Weapons"

7A Card: Aircraft Vulnerable Area Tables

The values assigned by PIP to the three aircraft vulnerable area tables representing the three senario threat classes are given in Tables I, II and III respectively.

08 Card: Ground Weapon Reaction and Tracking Times

Card 08 is omitted by PIP. Values are assigned within P001.

09 Card: Ground Weapon Parameters

Card 09 is omitted by PIP. Values are assigned within P001.

9A Card: Ground Weapon Parameters

Card 9A is omitted by PIP. Values are assigned within P001.

10 Card: Ground Weapon Projectile Parameters

Card 10 is omitted by PIP. Values are assigned within P001.

11 Card: Logical Unit Input Option

Card 11 is omitted by PIP. Logical Unit 5 is assigned for input within P001.

07 VULNERABLE AREA TABLE VS TYPE 1 ANC 2 WEAPONS

0.464	0.464	7.107	7.107	7.107	7.107	7.107	7.107
0.657	0.657	5.551	5.551	5.551	5.551	5.551	5.551
0.697	0.697	5.574	5.574	5.574	5.574	5.574	5.574
0.657	0.657	7.357	7.357	7.357	7.357	7.357	7.357
0.697	0.697	5.574	5.574	5.574	5.574	5.574	5.574
0.657	0.657	5.551	5.551	5.551	5.551	5.551	5.551
0.697	0.697	5.574	5.574	5.574	5.574	5.574	5.574
0.657	0.657	7.357	7.357	7.357	7.357	7.357	7.357
0.697	0.697	5.574	5.574	5.574	5.574	5.574	5.574
0.464	0.464	0.743	0.743	0.743	0.743	0.743	0.743
0.657	0.657	2.858	2.858	2.858	2.858	2.858	2.858
0.464	0.464	3.298	3.298	3.298	3.298	3.298	3.298
0.657	0.657	2.858	2.858	2.858	2.858	2.858	2.858
0.464	0.464	0.743	0.743	0.743	0.743	0.743	0.743
0.657	0.657	2.858	2.858	2.858	2.858	2.858	2.858
0.464	0.464	3.298	3.298	3.298	3.298	3.298	3.298
0.657	0.657	2.858	2.858	2.858	2.858	2.858	2.858
0.657	0.657	5.551	5.551	5.551	5.551	5.551	5.551
0.697	0.697	5.574	5.574	5.574	5.574	5.574	5.574
0.657	0.657	7.357	7.357	7.357	7.357	7.357	7.357
0.697	0.697	5.574	5.574	5.574	5.574	5.574	5.574
0.657	0.657	5.551	5.551	5.551	5.551	5.551	5.551
0.697	0.697	5.574	5.574	5.574	5.574	5.574	5.574
0.657	0.657	7.357	7.357	7.357	7.357	7.357	7.357
0.697	0.697	5.574	5.574	5.574	5.574	5.574	5.574
0.464	0.464	7.107	7.107	7.107	7.107	7.107	7.107

TABLE I. Aircraft Vulnerable Area Table (Type 1 and 2 Weapons)

07 VULNERABLE AREA TABLE VS TYPE 3 WEAPONS

12.540	12.540	13.470	13.470	13.470	13.470	13.470	13.470
9.853	9.853	10.510	10.510	10.510	10.510	10.510	10.510
9.639	9.639	11.150	11.150	11.150	11.150	11.150	11.150
12.640	12.640	14.780	14.780	14.780	14.780	14.780	14.780
9.639	9.639	11.150	11.150	11.150	11.150	11.150	11.150
9.853	9.853	10.510	10.510	10.510	10.510	10.510	10.510
9.639	9.639	11.150	11.150	11.150	11.150	11.150	11.150
12.640	12.640	14.780	14.780	14.780	14.780	14.780	14.780
9.639	9.639	11.150	11.150	11.150	11.150	11.150	11.150
1.394	1.394	1.394	1.394	1.394	1.394	1.394	1.394
4.762	4.762	6.240	6.240	6.240	6.240	6.240	6.240
5.342	5.342	7.432	7.432	7.432	7.432	7.432	7.432
4.762	4.762	6.240	6.240	6.240	6.240	6.240	6.240
1.394	1.394	1.394	1.394	1.394	1.394	1.394	1.394
4.762	4.762	6.240	6.240	6.240	6.240	6.240	6.240
5.342	5.342	7.432	7.432	7.432	7.432	7.432	7.432
4.762	4.762	6.240	6.240	6.240	6.240	6.240	6.240
9.853	9.853	10.510	10.510	10.510	10.510	10.510	10.510
9.639	9.639	11.150	11.150	11.150	11.150	11.150	11.150
12.640	12.640	14.780	14.780	14.780	14.780	14.780	14.780
9.639	9.639	11.150	11.150	11.150	11.150	11.150	11.150
9.853	9.853	10.510	10.510	10.510	10.510	10.510	10.510
9.639	9.639	11.150	11.150	11.150	11.150	11.150	11.150
12.640	12.640	14.780	14.780	14.780	14.780	14.780	14.780
9.639	9.639	11.150	11.150	11.150	11.150	11.150	11.150
12.540	12.540	13.470	13.470	13.470	13.470	13.470	13.470

TABLE II. Aircraft Vulnerable Area Table (Type 3 Weapons)

07 VULNERABLE AREA TABLE VS TYPE 5 WEAPCN

55.370	55.370	55.370	55.370	55.370	55.370	55.370	55.370
43.220	43.220	43.220	43.220	43.220	43.220	43.220	43.220
47.100	47.100	47.100	47.100	47.100	47.100	47.100	47.100
62.530	62.530	62.530	62.530	62.530	62.530	62.530	62.530
47.100	47.100	47.100	47.100	47.100	47.100	47.100	47.100
43.220	43.220	43.220	43.220	43.220	43.220	43.220	43.220
47.100	47.100	47.100	47.100	47.100	47.100	47.100	47.100
62.530	62.530	62.530	62.530	62.530	62.530	62.530	62.530
47.100	47.100	47.100	47.100	47.100	47.100	47.100	47.100
5.761	5.761	5.761	5.761	5.761	5.761	5.761	5.761
27.450	27.450	27.450	27.450	27.450	27.450	27.450	27.450
33.070	33.070	33.070	33.070	33.070	33.070	33.070	33.070
27.450	27.450	27.450	27.450	27.450	27.450	27.450	27.450
5.761	5.761	5.761	5.761	5.761	5.761	5.761	5.761
27.450	27.450	27.450	27.450	27.450	27.450	27.450	27.450
33.070	33.070	33.070	33.070	33.070	33.070	33.070	33.070
27.450	27.450	27.450	27.450	27.450	27.450	27.450	27.450
5.761	5.761	5.761	5.761	5.761	5.761	5.761	5.761
47.100	47.100	47.100	47.100	47.100	47.100	47.100	47.100
62.530	62.530	62.530	62.530	62.530	62.530	62.530	62.530
47.100	47.100	47.100	47.100	47.100	47.100	47.100	47.100
43.220	43.220	43.220	43.220	43.220	43.220	43.220	43.220
47.100	47.100	47.100	47.100	47.100	47.100	47.100	47.100
62.530	62.530	62.530	62.530	62.530	62.530	62.530	62.530
47.100	47.100	47.100	47.100	47.100	47.100	47.100	47.100
55.370	55.370	55.370	55.370	55.370	55.370	55.370	55.370

TABLE III. Aircraft Vulnerable Area Table (Type 5 Weapon)

13 Card: Radar Multipath Parameters

IMUL: Assigned by the user on the PIP option card. If IMUL = 0, no multipath effects are considered. If IMUL = 1, multipath radar effects are taken into consideration in the P001 analysis.

IRMP: Radar type identification assigned by PIP, specifying the tracking radar. The value of IRMP indicates appropriate radar parameters within P001. The value of IRECM, assigned by PIP on Card 14, dictates the value of IRMP. The radar parameters and the relationship between IRMP and IRECM are as follows:

	IRECM	IRMP	Beamwidth (deg)	Squint Angle (deg)	Calibration Constant
Gun 6:	1	1	1.4	0.5	0.759
Gun 7:	2,3	2	1.8	0.6	1.060

Multipath radar effects do not apply to guns 1 through 5.

REFC = 0.35: Reflection coefficient. 0.35 is a typical value for terrain with vegetation.

14 Card: ECM (Jamming) Parameters

IJAM: Assigned by the user on the PIP option card. 0 = no jamming. 1 = jamming effects considered in P001 analysis.

IP = 5: Print every 5th value in J/S printout.

IJ = 0. Therefore, GAINJ is the antenna gain of the jammer.

GAINJ = 1.0: The antenna gain of the jammer is 1.0.

PJW: Jammer power, assigned by the user on the PIP option card.

PLEN = 1.0E-06: The length of the jammer cover pulse is 1 microsecond, a standard value.

IX = 1: A radar cross section table is provided by PIP. (Table IV).

XSEC = 0: XSEC is not used if IX = 1. If used (IX = 0), a constant cross section of XSEC m^2 is used.

CALX = 1: The radar cross section table is not scaled.

IRECM: The value of IRECM defaulted by PIP depends upon the gun type and mode. IRECM calls up certain radar parameters from a data statement within P001. IRECM values and the relationship with the gun type and mode are as follows:

Gun Type (IGT)	Mode (IEM)	Radar ID (IRECM)	Gain (RGDB)	Power (PRW)	Frequency (FREQ)	SJTMAX
1	1	N/A	N/A	N/A	N/A	N/A
2	1	N/A	N/A	N/A	N/A	N/A
3	3,4	1	40.0 dB	150,000	15.1E9	3.0 dB
5	3	2 (no AJ)	38.5 dB	175,000	9.38E9	1.5 dB
5	3	3 (AJ)	38.5 dB	175,000	9.38E9	17 dB

SJTMAX: Assigned by PIP as indicated above. SJTMAX is the threshold where tracking errors become significant.

RGDB, PRW, FREQ: Assigned within P001.

<u>12 Card</u>: Print Options for Output

IPRINT(1) through IPRINT(7): If the extended output option is chosen by the user on the PIP option card, IPRINT(1) through IPRINT(7) = 1 and an extended printout of the result of the P001 analysis is obtained. If the extended output

1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
1000.000	1000.000	1000.000					
100.000	100.000	100.000	100.000	100.000	100.000	100.000	100.000
100.000	100.000	100.000	100.000	100.000	100.000	100.000	100.000
100.000	100.000	100.000					
0.273	0.178	0.053	0.023	0.156	0.166	0.063	0.173
0.235	0.047	0.020	0.015	0.011	0.073	0.072	0.019
0.028	0.110	0.454					
0.005	0.005	0.007	0.011	0.093	0.093	0.039	0.068
0.112	0.032	0.019	0.015	0.009	0.035	0.032	0.017
0.033	0.102	0.509					
0.273	0.178	0.053	0.023	0.156	0.166	0.063	0.173
0.235	0.047	0.020	0.015	0.011	0.073	0.072	0.019
0.028	0.110	0.454					
100.000	100.000	100.000	100.000	100.000	100.000	100.000	100.000
100.000	100.000	100.000	100.000	100.000	100.000	100.000	100.000
100.000	100.000	100.000					
1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
1000.000	1000.000	1000.000					

TABLE IV. Aircraft Radar Cross-section Table

option is not chosen, IPRINT(1) through IPRINT(7) = 0 and a summary of the P001 analysis is printed as output from P001.

III. SUMMARY AND CONCLUSIONS

The use of the P001 Input Program (PIP) to provide all required input to P001 greatly reduces the student involvement in the aircraft combat survivability scenario computer input procedure, freeing him from time consuming, tedious computations and keypunching which do not contribute profitably to the aircraft combat survivability learning experience. In addition, PIP provides an indication as to the realism of the input data, thus contributing to the validity of the result of the P001 analysis.

Introduction of the Calspan Improved P001 Computer Program into aircraft combat survivability studies provides the class problem in survivability assessment with ECM (jamming), ECCM (anti-jam) and radar multipath features which are realistic parameters to be considered in any current aircraft combat survivability situation.

As developed, the PIP target aircraft performance parameters are those of a "typical" Navy attack aircraft, having flight characteristics that are realistic, but which can not be used to describe the performance of any specific aircraft. As a future project, specific aircraft flight performance parameters and equations could be added to PIP in the form of a flight path generator program to give the input program the added capability of simulating the flight path of a specific aircraft.

APPENDIX A

AIRCRAFT COMBAT SURVIVABILITY PROBLEM

This Appendix contains a complete package for a class problem in aircraft attrition in a hostile AAA environment for AE 3251, Aircraft Combat Survivability.

AE 3251

AIRCRAFT COMBAT SURVIVABILITY

A STUDY

of

AIRCRAFT ATTRITION

in a

HOSTILE AAA ENVIRONMENT

NAVAL POSTGRADUATE SCHOOL
MONTEREY, CALIFORNIA

TABLE OF CONTENTS

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LIST OF FIGURES

I. INTRODUCTION

This aircraft attrition study is designed to present the student with an opportunity to see first hand how the survivability of an aircraft can be evaluated in a given combat scenario. The methods employed in this study are those used by both industry and government when making crucial decisions in the survivability design of an aircraft weapon system. In this study, a computer program named P001 (AFATL Antiaircraft Artillery Simulation Computer Program) will be used to (1) simulate the flight of a typical Naval attack aircraft through a hostile antiaircraft artillery (AAA) environment and (2) compute the aircraft probability of survival.[1]

Section II describes all of the steps necessary to complete this study. Note the flow of the survivability assessment process from a physical description of the aircraft to a determination of its capabilities to withstand certain threat levels (i.e., its vulnerability), to a scenario in which both offensive and defensive strategies must be employed, to the final phase of simulating flight through the hostile environment and computing probabilities of survival using a modern, state-of-the-art computer program.

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[1] The Navy specifies the use of P001 in all non-nuclear survivability assessments in MIL-STANDARD-2072(AS), SURVIVABILITY, AIRCRAFT; ESTABLISHMENT AND CONDUCT OF PROGRAMS FOR, August 1977.

The student should develop a good appreciation for the magnitude of the survivability problem by keeping the above survivability assessment process in mind when working each part of the analysis.

II. PROBLEM DEFINITION

A. You are going to conduct a survivability assessment of a familiar Naval aircraft, shown in Figs. 1 and 2, on a typical attack mission to destroy the bridge shown in Fig. 3.

B. The class will be divided into groups of four, with two members in each group on the blue team and two members on the red team.

C. Each team will independently determine the vulnerable areas of the aircraft to the specified threat in the six major views.

D. Each team will use P001 to determine the survivability of the aircraft in the class problem scenario, as follows:

1. Each team will select a flight path to the bridge according to the rules of the scenario given in Section IV. Keep this path a secret.
2. Each team will also select the locations of six AAA emplacements that will defend the bridge against an air attack. Locate the weapons according to the order of battle given in Section IV. Keep these locations secret, also.
3. Each team will conduct an attack against the other team in the group.
4. The input data cards for the computer run for the blue team attacking the bridge defended by the red team

will consist of the flight path of the blue aircraft flying through the AAA emplacements selected by the red team.

5. The input data cards for the computer run for the red team against the blue team will consist of the flight path of the red aircraft flying through the AAA emplacements selected by the blue team.

E. May the best team win. A small prize will be awarded to the team whose aircraft has the highest probability of survival against their opponent's weapon distribution.

F. Additional runs will be made against a preset AAA distribution to investigate the effects of ECM, ECCM, jinking, etc., on the survivability of the aircraft.

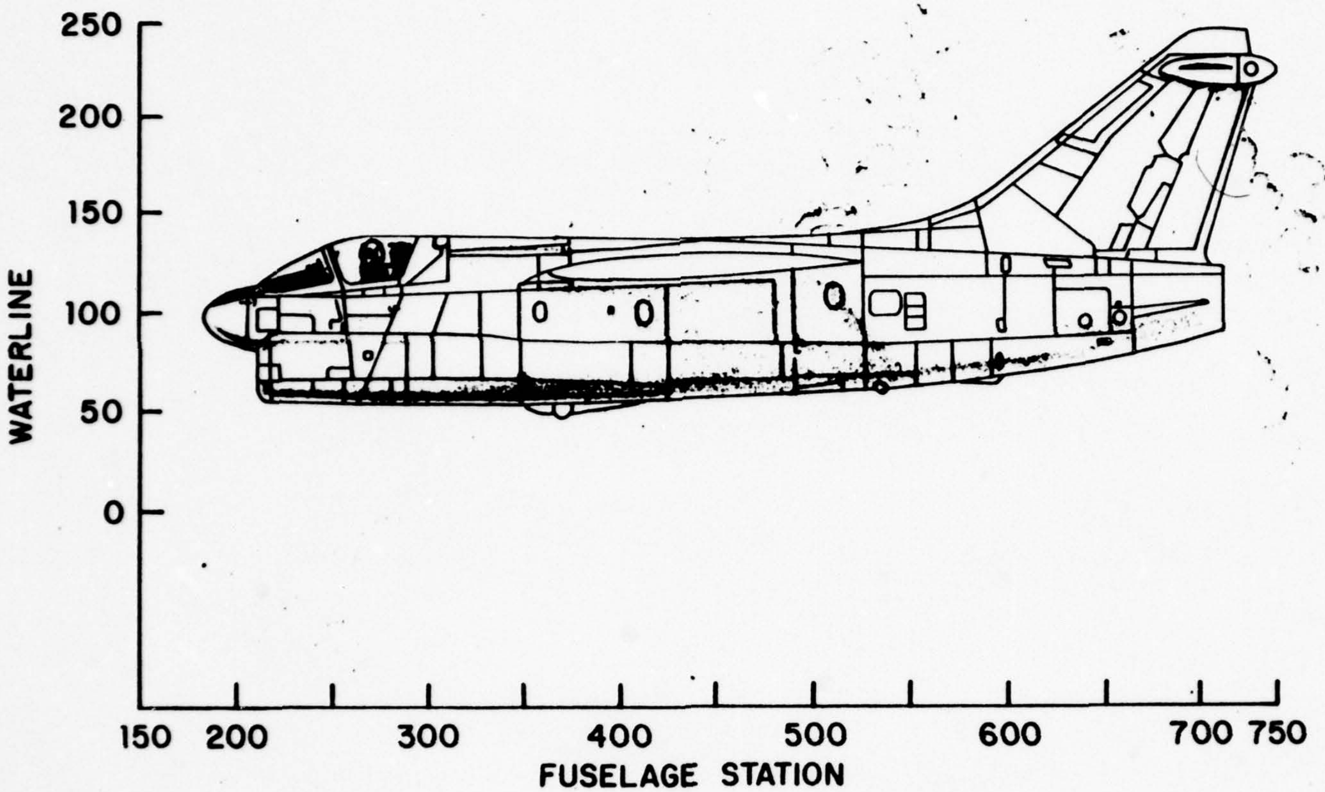
250
200
150
100
50
0
WATERLINE
150 200 300 400 500 600 700 750
FUSELAGE STATION

Figure 1

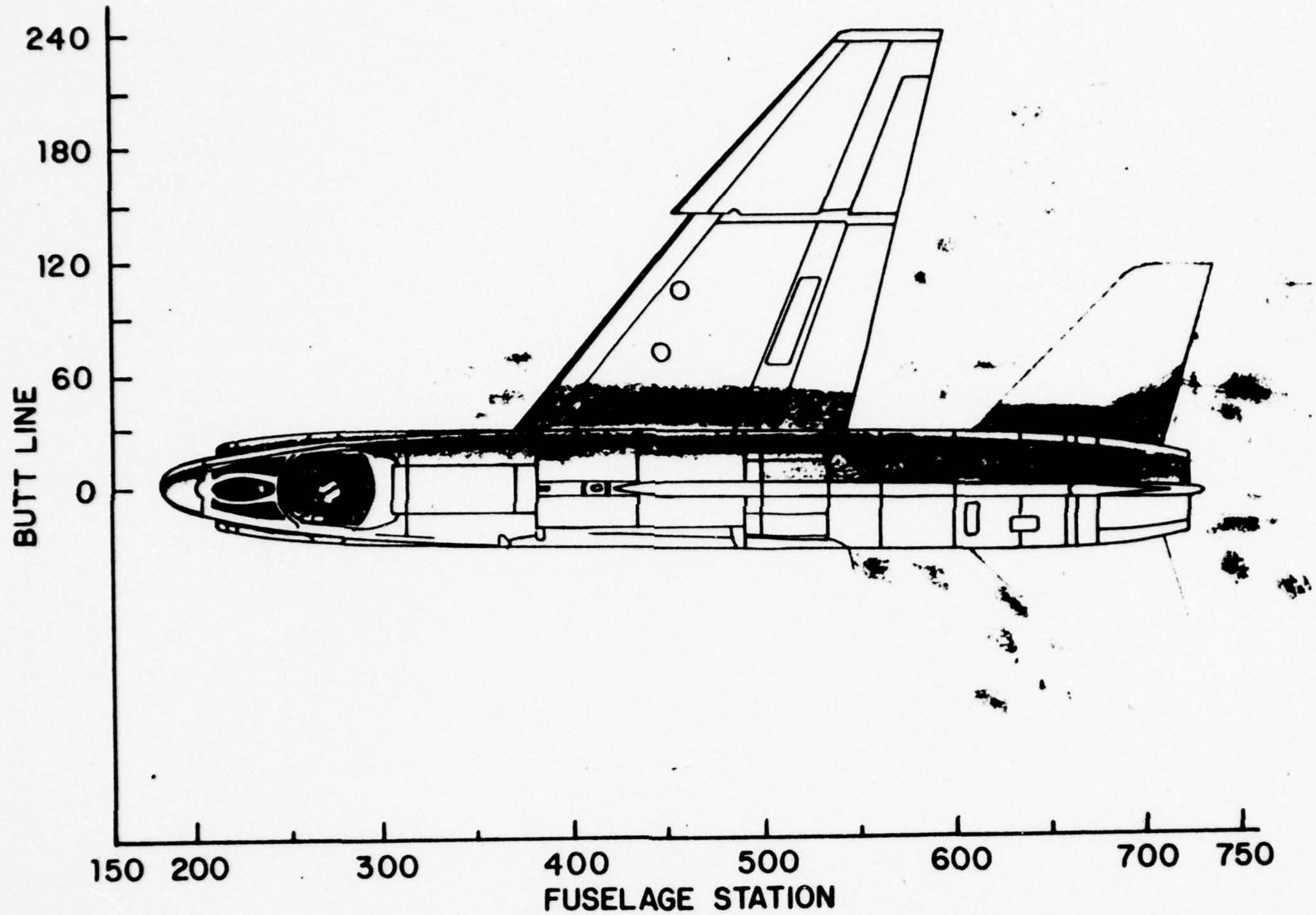
240
180
120
60
0
BUTT LINE
150
200
300
400
500
600
700
750
FUSELAGE STATION

Figure 2

AE 3251
CLASS PROBLEM SCENARIO

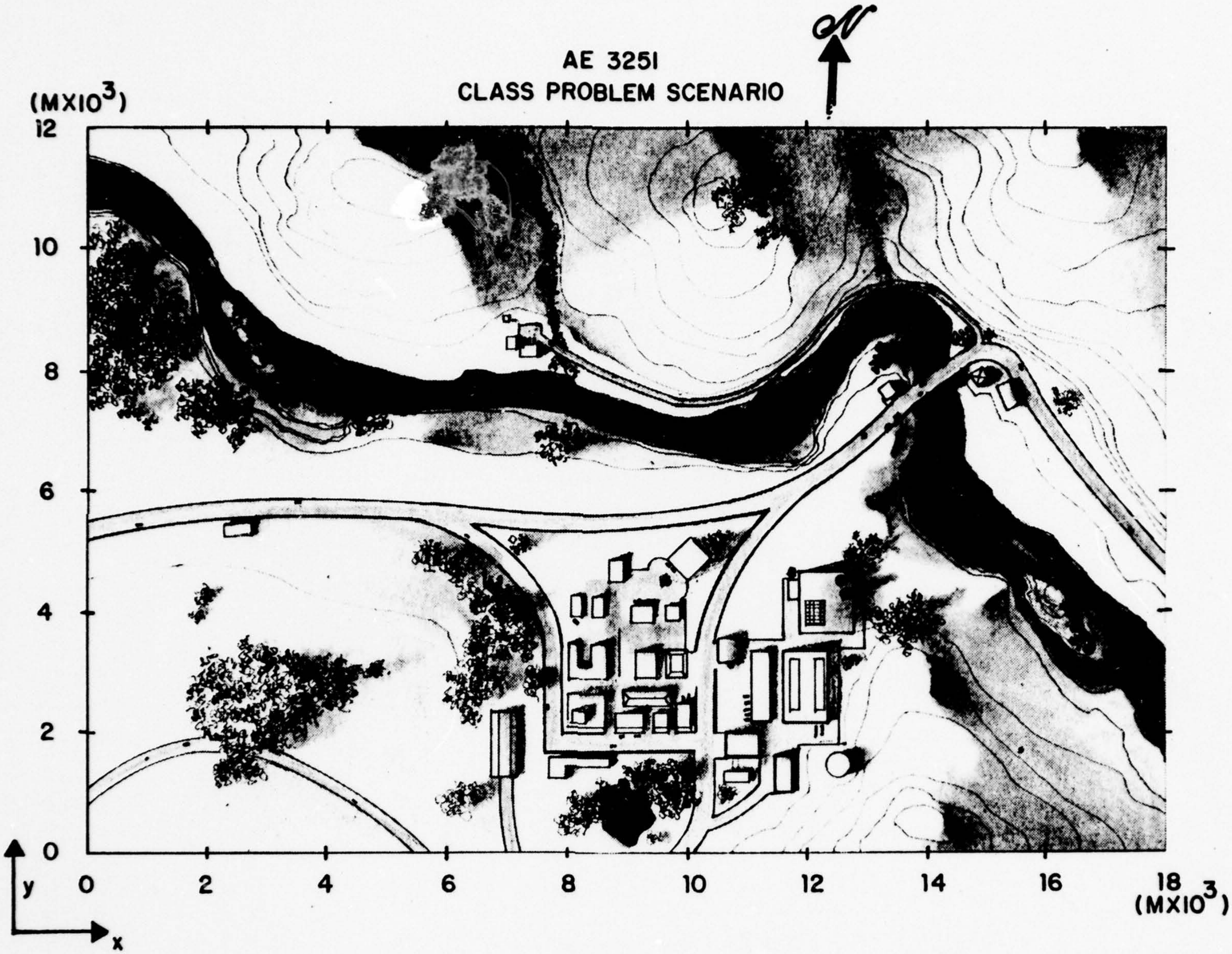

Figure 3

III. VULNERABILITY ASSESSMENT DESCRIPTION

A. GENERAL METHODOLOGY

The six general requirements for a vulnerability assessment are discussed in detail in Chapter IV of the class text. The following data are given in support of this assessment procedure:

1. Kill Category = "A" Kill
2. Technical Description of the Aircraft - Figs. 1 and 2
3. Critical Components - Pilot, engine and fuel tanks.

    a. Each of these singly vulnerable components will make a contribution to Ap_i, the total presented area of the aircraft.

    b. The total presented area is assumed to be a "shoe box" centered around the aircraft center of gravity.

4. Damage Analysis - Determination of $P_{K/H}$ for each of the components will be discussed in class due to the classified nature of the material.
5. Threat Types - To be discussed in class; Types I, II, III and V threats will be used in the scenario.
6. Determine Vulnerable Area - Use the equation:

$$A_V = \sum_i A_{p_i} \cdot P_{K/H_i}$$

where i = pilot, engine and fuel tanks.

B. SPECIFIC CALCULATIONS

The vulnerability assessment may now be completed in the following manner:

1. Measure the presented area of each critical component of the aircraft shown in Figs. 1 and 2 for the top/bottom, front/rear and left/right aspects and record in Table I.

2. Calculate the A_{v_i} for each component using the given P_{K/H_i} for the appropriate aspect and striking velocity and enter it into Table I.

3. In order to use the information compiled in Table I in P001, a more complete description of the aircraft A_v with changing aspect angle must be tabulated. This is normally done in a 26 view, 8 striking velocity vulnerable area table (VAT). Fig. 4 and Table II show how the aircraft is physically divided into these 26 different views. You have tabulated in Table I the total A_v for each of the striking velocities, but only for the six major aspects. The vulnerable area of the other views can be obtained by interpolating between these six aspects. The following is a summary of the six views you have done in Table I and their relationship to the 26 views needed to describe the aircraft:

View	View #	Long (AZ) (degrees)	Lat (Elev) (degrees)
Bottom	1	0	0
	2-9	0-315	45
Tail-on	10	0	90
	11	45	90
STBD Side	12	90	90
	13	135	90
Head-on	14	180	90
	15	215	90
Port Side	16	270	90
	17	315	90
	18-25	0-315	135
TOP	26	0	180

The A_V's you have calculated will not be used in the P001 analysis. Instead, predetermined VATS for each threat type will be used in order to provide a standardized aircraft for the attrition study.

4. Turn in Table I prior to initiating a computer run for the analysis.

TABLE I.

SINGLY VULNERABLE AREA (A_V) SUMMARY FORM

Assessment Date ____________
Performing Organization ____________
Kill Category ____________

Aircraft ____________
Threat ____________

Projectile V_S, ft/sec (m/sec)				500 (152.4)		1,000 (304.8)		1,500 (457.2)		2,000 (609.6)		2,500 (762.0)		3,000 (914.4)		3,500 (1066.8)	
Aspect	Component		A_P	$P_{K/H}$	A_V	$P_{K/H}$	A_V	$P_{K/H}$	A_V	$P_{K/H}$	A_V	$P_{K/H}$	A_V	$P_{K/H}$	A_V	$P_{K/H}$	A_V
TOP/ BOTTOM	PILOT																
	ENGINE																
	FUEL TANKS	FUSELAGE															
		WINGS															
	TOTAL																
FRONT/ REAR	PILOT																
	ENGINE																
	FUEL TANKS	FUSELAGE															
		WINGS															
	TOTAL																
LEFT/ RIGHT	PILOT																
	ENGINE																
	FUEL TANKS	FUSELAGE															
		WINGS															
	TOTAL																

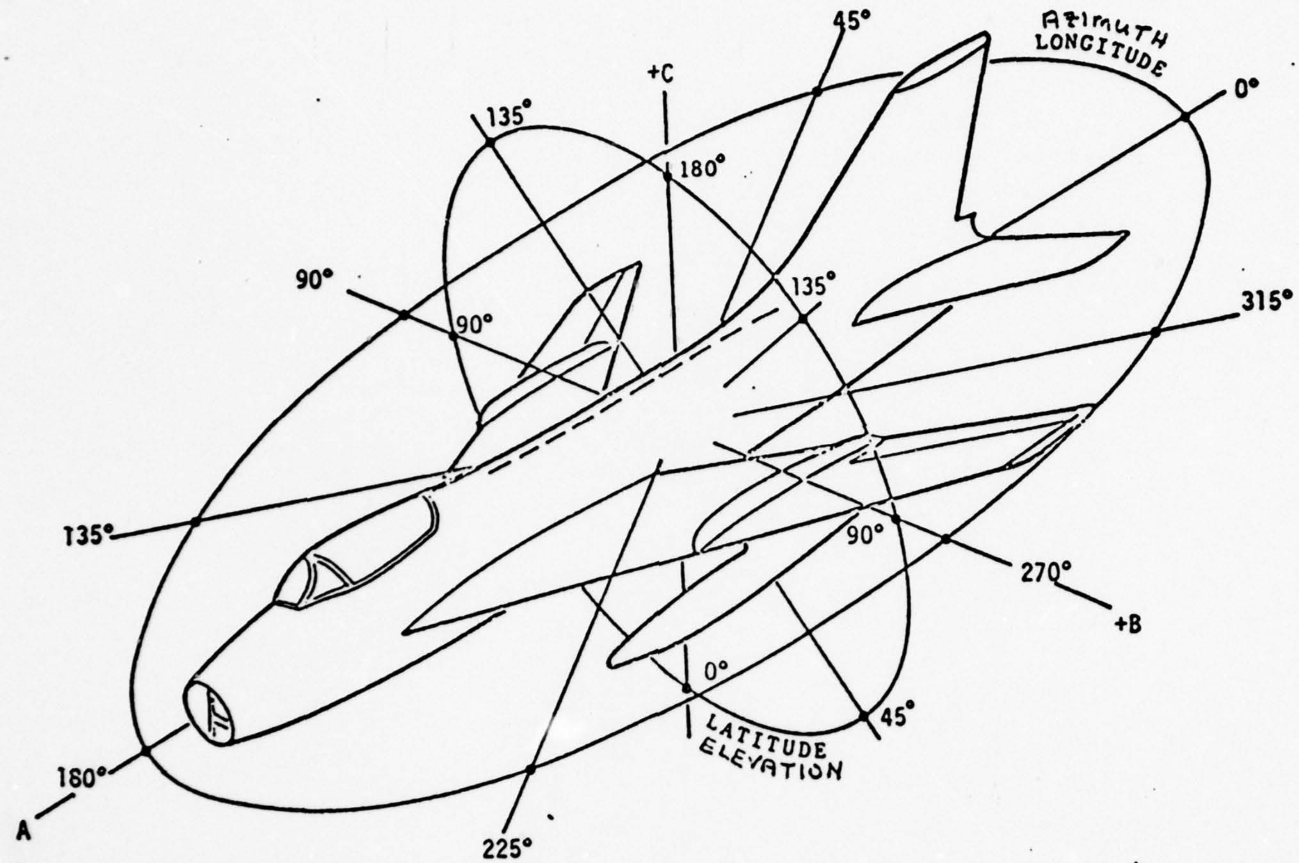

Figure 4 Longitude and Latitude of Aircraft for Vulnerable Area Computation

TABLE II VULNERABLE AREA TABLES

Card Number	I	J	Aircraft View
1	1	1	0° Longitude, 0° Latitude
2	1	2	0° Longitude, 45° Latitude
3	2	2	45° Longitude, 45° Latitude
4	3	2	90° Longitude, 45° Latitude
5	4	2	135° Longitude, 45° Latitude
6	5	2	180° Longitude, 45° Latitude
7	6	2	225° Longitude, 45° Latitude
8	7	2	270° Longitude, 45° Latitude
9	8	2	315° Longitude, 45° Latitude
10	1	3	0° Longitude, 90° Latitude
11	2	3	45° Longitude, 90° Latitude
12	3	3	90° Longitude, 90° Latitude
13	4	3	135° Longitude, 90° Latitude
14	5	3	180° Longitude, 90° Latitude
15	6	3	225° Longitude, 90° Latitude
16	7	3	270° Longitude, 90° Latitude
17	8	3	315° Longitude, 90° Latitude
18	1	4	0° Longitude, 135° Latitude
19	2	4	45° Longitude, 135° Latitude
20	3	4	90° Longitude, 135° Latitude
21	4	4	135° Longitude, 135° Latitude
22	5	4	180° Longitude, 135° Latitude
23	6	4	225° Longitude, 135° Latitude
24	7	4	270° Longitude, 135° Latitude
25	8	4	315° Longitude, 135° Latitude
26	1	5	0° Longitude, 180° Latitude

NOTE: Refer to Figure 4 for definition of longitude and latitude.

IV. SCENARIO DESCRIPTION

A. This scenario is purely for instructional purposes and is not based on any actual or planned combat attack situation. The target site, order of battle, attack heading, and outbound flight path parameter limits have been chosen only to provide guidelines for the class problem. As much realism has been introduced for the players as possible while retaining an unclassified scenario.

B. Your target is the bridge shown in Fig. 3 located at:

x: 14,100 meters

y: 7,900 meters

z: 20 meters

Heavy military supply traffic has been reported in this area. Your mission is to destroy this vital supply link.

C. The following order of battle has been gathered from intelligence reports of the target area:

Interceptor Aircraft -	three airfields within striking distance
SAM -	six sites within a 125 km radius.
AAA -	two type 1 mode 1
	two type 2 mode 1
	one type 3 mode 4
	one type 3 mode 3
	one type 5 mode 3

(Note: Gun types and their relationship to AAA will be discussed in class.)

Ground Troops - regular infantry and civilian militia are numerous in the target area.

D. The SAM threat and the presence of enemy aircraft requires that the inbound approach to the target be made from the west at low level. A pop-up maneuver is required to visually identify the target followed by a dive bombing run to weapon delivery. Egress must be made to either the north or south, depending on individual strategy.

E. The following is a list of scenario limitations to be used in the development of your strategy:

1. Flight path milestones - specify at least one milestone for approximately 500 meters of flight path.

2. Aircraft cruise speed - 210 to 250 meters per second.

3. Inbound altitude - 70 to 450 meters.

4. Pop-up maneuver

a. Commence maneuver - 4,000 to 6,000 meters from the target.

b. Maneuver altitude - minimum 1,220 meters; maximum 2,130 meters.

5. Weapons delivery.

a. Alignment - the leg immediately prior to the bomb release point must be 600 meters in length (straight) and must have a heading within 5° of the heading to the target from the bomb release point.

b. Bomb release range - 1,000 meters maximum.

c. Bomb release altitude - 310 to 910 meters.

(Note: A typical 20° dive commenced from 1,000 meters of altitude at 2,500 meters from the target will release weapons at 400 meters of altitude about 700 meters from the target and will lose 160 meters in the pull-out.)

6. Maneuvering - if any turn along the flight path is greater than 28°, the maximum g loading of 6 will be exceeded.

7. Weapons placement.

a. Two type 1 mode 1, two type 2 mode 1, one type 3 mode 4, and one type 3 mode 3 weapons are available for defense placement.

b. One type 5 mode 3 weapon is placed at x: 12,800 meters, y: 7,500 meters, and z: 20 meters. You do not specify the location of this weapon.

c. Neither of the type 3 weapons may be placed within 3,000 meters of the center of the bridge.

8. Jammer power - if the jamming function is specified, the jammer power you select must be no more than 1,000 watts.

F. Begin the flight path at an entry point of your choosing along the western boundary and end it along the northern or southern boundary. Note the terrain features, anticipate the AAA placement for bridge defense and plan your flight path accordingly.

G. Locate the AAA weapons given in the order of battle to best defend the bridge against your opponent's attacking aircraft.

V. INPUT DATA PREPARATION

A preprocessor for P001 has been developed at NPS that will punch all of the input cards for the execution of P001, with the exception of the green JOB card and the final orange END OF FILE card. This preprocessor is called PIP (P001 Input Program). The inputs to PIP are the x, y and z coordinates of your flight path milestones and your opponent's six AAA emplacement locations.

A. Milestone cards: The x, y and z coordinates of the aircraft (in meters) for up to 199 flight path milestones must be entered into PIP in 3F10.0 format, one milestone per card. (Milestone #1 will have an x coordinate of 0.0).

B. Milestone delimiter card: A card containing 99999., left justified, must be placed after the final milestone card.

C. Option control card: A control card follows the milestone delimiter card and specifies the aircraft cruise speed, the number of the bomb release milestone (count the initial position on the western border as milestone #1), eight input/output/scenario options and the jammer power. The data on the control card must be specified in F10.0,I2,8I1,F10.0 format and contains the following parameters:

(columns 1-10): Aircraft cruise speed in meters per second

(columns 11-12): Number of the bomb release milestone.

(column 13): EW option - 0 for no jamming, 1 for jamming.

(column 14): ECCM anti-jam option - 0 for no AJ, 1 for radar AJ.

(column 15): Radar multipath option - 0 for no multipath effects, 1 for radar degradation caused by multipath effects.

(column 16): Gun location option - 0 specifies PIP preset AAA locations, 1 requires user input of the six AAA locations.

(column 17): List option - 0 for no listing of the P001 input deck, 1 for listing of P001 input deck.

(column 18): Punch option - 0 for no punched P001 input deck, 1 for punched P001 input deck.

(column 19): Plot option - 0 for no scenario plot, 1 for scenario plot.

(column 20): Extended output option - 0 for no extended output, 1 for extended printout of P001 analysis results.

(columns 21-30): Jammer power in watts (0 to 1,000 watts).

D. Gun emplacement location cards: If column 16 on the control card contains a 1, six gun location cards specifying the x, y and z coordinates of each of the gun emplacements (format 3F10.0) specified in the order given in the order of battle are required as input data.

E. Sample PIP input deck:

```
//  ( Green JOB Card, TIME=2 )
//  EXEC NVTECGO,NAME=PIP,REGION=200K
//STEPLIB DD DSN=F0559.PIP,UNIT=3330,VOL=SER=DISK02,DISP=SHR
//FT06F001 DD SYSOUT=A,DCB=(RECFM=FBA,LRECL=133,BLKSIZE=3325)
//GO.FT07F001 DD SYSOUT=B
//GO.SYSIN DD*
0.         500.       450.
500.       500.       440.
900.       600.       445.
(etc., until all milestones are described)
99999.
232.0      2511111111    500.0
14800.     9000.      20.
16200.     8200.      10.
(etc., until all six AAA locations are described)
/*
```

F. When the P001 input deck punched by PIP is received, put the green JOB card used for PIP on top of the deck and an orange /* (EOF) card on the bottom of the deck and read it through the card reader. The output of this deck will be a combat survivability analysis for the given flight path and AAA emplacement locations.

APPENDIX B

PIP INPUT DECK LISTING

```
THE FOLLOWING IS AN EXAMPLE OF THE INPUT TO THE P001 INPUT PROGRAM (PIP)
TO BE RUN FROM A LOAD MODULE (DISK 02).  THE INPUT UTILIZES THE PRESET
GUN EMPLACEMENT LOCATIONS OPTION AND THE ELECTRONIC WARFARE (JAMMING),
ANTI-JAM AND MULTIPATH SCENARIO OPTIONS.  THE CONTROL CARD ALSO SPECIFIES
THAT THE OUTPUT BE LISTED, PUNCHED AND PLOTTED.  THERE ARE 20 MILESTONES,
MILESTONE 15 IS THE BOMB RELEASE MILESTONE AND THE CRUISE SPEED IS
SPECIFIED AS 232.0 METERS PER SECOND.  THE EXTENDED OUTPUT OPTION IS
SPECIFIED.


//   ( GREEN JOB CARD )
// EXEC NVTECGO,NAME=PIP
//STEPLIB DD DSN=F0559.PIP,UNIT=3330,VOL=SER=DISK02,DISP=SHR
//FT06F001 DD SYSOUT=A,DCB=(RECFM=FBA,LRECL=133,BLKSIZE=3325)
//GO.FT07F001 DD  SYSOUT=B
//GO.SYSIN DD *
0.          500.        457.
1386.       399.        423.
2742.       436.        434.
4054.       155.        374.
5406.       338.        421.
6762.       438.        436.
8129.       349.        380.
9508.       589.        412.
10767.      1122.       448.
11588.      1934.       455.
12054.      2378.       1880.
12844.      3114.       2130.
13529.      4236.       2120.
14050.      5488.       1698.
14097.      6922.       914.
15127.      7738.       606.
16479.      8466.       562.
17619.      9480.       474.
17881.      10972.      456.
17872.      11894.      457.
99999.
  232.0     1511101111 500.0
/*
```

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APPENDIX C

PIP OUTPUT LISTING

```
THE FOLLOWING IS THE OUTPUT FROM THE P001 INPUT PROGRAM (PIP) UTILIZING
THE PRESET GUN EMPLACEMENT LOCATIONS AND THE ELECTRONIC WARFARE (JAMMING),
ANTI-JAM, MULTIPATH AND EXTENDED OUTPUT OPTIONS:


// EXEC PGM=P1EW,REGION=200K
//STEPLIB DD DSN=F0559.P1EW,UNIT=3330,VOL=SER=DISK02,DISP=SHR
//FT06F001 DD SYSOUT=A,DCB=(RECFM=FBA,LRECL=133,BLKSIZE=3325)
//GO.FT04F001 DD UNIT=SYSDA,SPACE=(CYL,(1,1)),
//      DCB=(RECFM=VBS,LRECL=404,BLKSIZE=3236)
//GO.FT07F001 DD UNIT=SYSDA,SPACE=(CYL,(1,1)),
//      DCB=(RECFM=VBS,LRECL=404,BLKSIZE=3236)
//GO.FT08F001 DD UNIT=SYSDA,SPACE=(CYL,(1,1)),
//      DCB=(RECFM=VBS,LRECL=404,BLKSIZE=3236)
//GO.FT09F001 DD UNIT=SYSDA,SPACE=(CYL,(1,1)),
//      DCB=(RECFM=VBS,LRECL=404,BLKSIZE=3236)
//FT11F001 DD UNIT=SYSDA,SPACE=(CYL,(1,1)),
//      DCB=(RECFM=VBS,LRECL=404,BLKSIZE=3236)
//GO.FT05F001 DD *

01   AIRCRAFT COMBAT SURVIVABILITY SCENARIO
02      12             114.73   0.1147
       0.0       0.0     500.0     457.0     231.3    -16.9     -5.7    355.8    -1.4     0.0
       6.0    1386.0     399.0     423.0     231.7    -16.9      1.9    355.8     0.5    21.6
      11.8    2742.0     436.0     434.0     231.8      6.3    -10.4      1.6    -2.6   -44.0
      17.6    4054.0     155.0     374.0     227.4    -48.7      8.0    347.9     2.0    54.8
      23.5    5406.0     338.0     421.0     230.0     31.1      2.6      7.7     0.6   -13.8
      29.3    6762.0     438.0     436.0     231.1     17.0     -9.5      4.2    -2.3   -29.2
      35.2    8129.0     349.0     380.0     232.0    -15.1      5.3    356.3     1.3    43.6
      41.3    9508.0     589.0     412.0     228.6     39.8      6.1      9.9     1.5    41.8
      47.2   10767.0    1122.0     448.0     213.4     90.3      1.4     22.9     0.3    56.7
      52.2   11588.0    1934.0     455.0      67.8     67.1    211.2     44.7    65.7    -4.7
      59.4   12054.0    2378.0    1880.0     139.1    132.5     44.5     43.6    13.0    -1.8
      65.0   12844.0    3114.0    2130.0     147.1    137.1     -1.5     43.0    -0.4    45.6
      71.4   13529.0    4236.0    2120.0     103.5    169.5    -61.8     58.6   -17.3    27.4
      78.1   14050.0    5488.0    1698.0      73.4    176.5   -104.5     67.4   -28.7    51.1
      85.4   14097.0    6922.0     914.0       7.3    224.1    -52.6     88.1   -13.2   -70.4
      91.2   15127.0    7738.0     606.0     183.2    145.1     -6.7     38.4    -1.6   -35.8
      97.8   16479.0    8466.0     562.0     205.6    110.7    -13.5     28.3    -3.3    40.2
     104.3   17619.0    9480.0     474.0     175.1    155.7     -2.8     41.7    -0.7    67.8
     110.8   17881.0   10972.0     456.0      40.5    230.5      0.3     80.0     0.1    34.1
     114.7   17872.0   11894.0     457.0      40.4    230.2      0.0     80.0     0.0     0.0
/*
//GC.FT05F002 DD *
03          14800.    9000.      40.
```

```
04 11111
05      11.0
06   1 9 11.473   22.946   34.419   45.893   57.366   68.839   80.312   91.785 103.258
07   VULNERABLE AREA TABLE VS TYPE 1 AND 2 WEAPONS
    0.464    0.464    7.107    7.107    7.107    7.107    7.107    7.107
    0.657    0.657    5.551    5.551    5.551    5.551    5.551    5.551
    0.697    0.697    5.574    5.574    5.574    5.574    5.574    5.574
    0.657    0.657    7.357    7.357    7.357    7.357    7.357    7.357
    0.697    0.697    5.574    5.574    5.574    5.574    5.574    5.574
    0.657    0.657    5.551    5.551    5.551    5.551    5.551    5.551
    0.697    0.697    5.574    5.574    5.574    5.574    5.574    5.574
    0.657    0.657    7.357    7.357    7.357    7.357    7.357    7.357
    0.697    0.697    5.574    5.574    5.574    5.574    5.574    5.574
    0.464    0.464    0.743    0.743    0.743    0.743    0.743    0.743
    0.657    0.657    2.858    2.858    2.858    2.858    2.858    2.858
    0.464    0.464    3.298    3.298    3.298    3.298    3.298    3.298
    0.657    0.657    2.858    2.858    2.858    2.858    2.858    2.858
    0.464    0.464    0.743    0.743    0.743    0.743    0.743    0.743
    0.657    0.657    2.858    2.858    2.858    2.858    2.858    2.858
    0.464    0.464    3.298    3.298    3.298    3.298    3.298    3.298
    0.657    0.657    2.858    2.858    2.858    2.858    2.858    2.858
    0.657    0.657    5.551    5.551    5.551    5.551    5.551    5.551
    0.697    0.697    5.574    5.574    5.574    5.574    5.574    5.574
    0.657    0.657    7.357    7.357    7.357    7.357    7.357    7.357
    0.697    0.697    5.574    5.574    5.574    5.574    5.574    5.574
    0.657    0.657    5.551    5.551    5.551    5.551    5.551    5.551
    0.697    0.697    5.574    5.574    5.574    5.574    5.574    5.574
    0.657    0.657    7.357    7.357    7.357    7.357    7.357    7.357
    0.697    0.697    5.574    5.574    5.574    5.574    5.574    5.574
    0.464    0.464    7.107    7.107    7.107    7.107    7.107    7.107
121111111
03          16200.    8200.      40.
121111111
03          13600.    7200.      20.
04 21111
121111111
03          13400.    8000.      20.
121111111
03          11300.    9700.      50.
04 34411
07   VULNERABLE AREA TABLE VS TYPE 3 WEAPCNS
   12.540   12.540   13.470   13.470   13.470   13.470   13.470   13.470
    9.853    9.853   10.510   10.510   10.510   10.510   10.510   10.510
    9.639    9.639   11.150   11.150   11.150   11.150   11.150   11.150
   12.640   12.640   14.780   14.780   14.780   14.780   14.780   14.780
    9.639    9.639   11.150   11.150   11.150   11.150   11.150   11.150
    9.853    9.853   10.510   10.510   10.510   10.510   10.510   10.510
    9.639    9.639   11.150   11.150   11.150   11.150   11.150   11.150
```

```
  12.640   12.640   14.780   14.780   14.780   14.780   14.780   14.780
   9.639    9.639   11.150   11.150   11.150   11.150   11.150   11.150
   1.394    1.394    1.394    1.394    1.394    1.394    1.394    1.394
   4.762    4.762    6.240    6.240    6.240    6.240    6.240    6.240
   5.342    5.342    7.432    7.432    7.432    7.432    7.432    7.432
   4.762    4.762    6.240    6.240    6.240    6.240    6.240    6.240
   1.394    1.394    1.394    1.394    1.394    1.394    1.394    1.394
   4.762    4.762    6.240    6.240    6.240    6.240    6.240    6.240
   5.342    5.342    7.432    7.432    7.432    7.432    7.432    7.432
   4.762    4.762    6.240    6.240    6.240    6.240    6.240    6.240
   9.853    9.853   10.510   10.510   10.510   10.510   10.510   10.510
   9.639    9.639   11.150   11.150   11.150   11.150   11.150   11.150
  12.640   12.640   14.780   14.780   14.780   14.780   14.780   14.780
   9.639    9.639   11.150   11.150   11.150   11.150   11.150   11.150
   9.853    9.853   10.510   10.510   10.510   10.510   10.510   10.510
   9.639    9.639   11.150   11.150   11.150   11.150   11.150   11.150
  12.640   12.640   14.780   14.780   14.780   14.780   14.780   14.780
   9.639    9.639   11.150   11.150   11.150   11.150   11.150   11.150
  12.540   12.540   13.470   13.470   13.470   13.470   13.470   13.470
14   1   5 0 1.0          500.0      1.0E-06        1            1.0            1       3.00
GEND
  19     7      90.0      180.0     1000.0
 1000.000  1000.000  1000.000  1000.000  1000.000  1000.000  1000.000  1000.000
 1000.000  1000.000  1000.000  1000.000  1000.000  1000.000  1000.000  1000.000
 1000.000  1000.000  1000.000
  100.000   100.000   100.000   100.000   100.000   100.000   100.000   100.000
  100.000   100.000   100.000   100.000   100.000   100.000   100.000   100.000
  100.000   100.000   100.000
    0.273     0.178     0.053     0.023     0.156     0.166     0.063     0.173
    0.235     0.047     0.020     0.015     0.011     0.073     0.072     0.019
    0.028     0.110     0.454
    0.005     0.005     0.007     0.011     0.093     0.093     0.039     0.068
    0.112     0.032     0.019     0.015     0.009     0.035     0.032     0.017
    0.033     0.102     0.509
    0.273     0.178     0.053     0.023     0.156     0.166     0.063     0.173
    0.235     0.047     0.020     0.015     0.011     0.073     0.072     0.019
    0.028     0.110     0.454
  100.000   100.000   100.000   100.000   100.000   100.000   100.000   100.000
  100.000   100.000   100.000   100.000   100.000   100.000   100.000   100.000
  100.000   100.000   100.000
 1000.000  1000.000  1000.000  1000.000  1000.000  1000.000  1000.000  1000.000
 1000.000  1000.000  1000.000  1000.000  1000.000  1000.000  1000.000  1000.000
 1000.000  1000.000  1000.000
121111111
03          15600.   10900.      90.
04  33411
13   1     1 0.35
121111111
```

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```
03        12800.   7500.      20.
04 53211
07   VULNERABLE AREA TABLE VS TYPE 5 WEAPON
   55.370   55.370   55.370   55.370   55.370   55.370   55.370   55.370
   43.220   43.220   43.220   43.220   43.220   43.220   43.220   43.220
   47.100   47.100   47.100   47.100   47.100   47.100   47.100   47.100
   62.530   62.530   62.530   62.530   62.530   62.530   62.530   62.530
   47.100   47.100   47.100   47.100   47.100   47.100   47.100   47.100
   43.220   43.220   43.220   43.220   43.220   43.220   43.220   43.220
   47.100   47.100   47.100   47.100   47.100   47.100   47.100   47.100
   62.530   62.530   62.530   62.530   62.530   62.530   62.530   62.530
   47.100   47.100   47.100   47.100   47.100   47.100   47.100   47.100
    5.761    5.761    5.761    5.761    5.761    5.761    5.761    5.761
   27.450   27.450   27.450   27.450   27.450   27.450   27.450   27.450
   33.070   33.070   33.070   33.070   33.070   33.070   33.070   33.070
   27.450   27.450   27.450   27.450   27.450   27.450   27.450   27.450
    5.761    5.761    5.761    5.761    5.761    5.761    5.761    5.761
   27.450   27.450   27.450   27.450   27.450   27.450   27.450   27.450
   33.070   33.070   33.070   33.070   33.070   33.070   33.070   33.070
   27.450   27.450   27.450   27.450   27.450   27.450   27.450   27.450
    5.761    5.761    5.761    5.761    5.761    5.761    5.761    5.761
   47.100   47.100   47.100   47.100   47.100   47.100   47.100   47.100
   62.530   62.530   62.530   62.530   62.530   62.530   62.530   62.530
   47.100   47.100   47.100   47.100   47.100   47.100   47.100   47.100
   43.220   43.220   43.220   43.220   43.220   43.220   43.220   43.220
   47.100   47.100   47.100   47.100   47.100   47.100   47.100   47.100
   62.530   62.530   62.530   62.530   62.530   62.530   62.530   62.530
   47.100   47.100   47.100   47.100   47.100   47.100   47.100   47.100
   55.370   55.370   55.370   55.370   55.370   55.370   55.370   55.370
13  1     2 0.35
14  1   5 0 1.0          500.0    1.0E-06       1             1.0             3         17.00
GEND
   19     7     90.0      180.0      1000.0
  1000.000   1000.000   1000.000   1000.000   1000.000   1000.000   1000.000   1000.000
  1000.000   1000.000   1000.000   1000.000   1000.000   1000.000   1000.000   1000.000
  1000.000   1000.000   1000.000
   100.000    100.000    100.000    100.000    100.000    100.000    100.000    100.000
   100.000    100.000    100.000    100.000    100.000    100.000    100.000    100.000
   100.000    100.000    100.000
     0.273      0.178      0.053      0.023      0.156      0.166      0.063      0.173
     0.235      0.047      0.020      0.015      0.011      0.073      0.072      0.019
     0.028      0.110      0.454
     0.005      0.005      0.007      0.011      0.093      0.093      0.039      0.068
     0.112      0.032      0.019      0.015      0.009      0.035      0.032      0.017
     0.033      0.102      0.509
     0.273      0.178      0.053      0.023      0.156      0.166      0.063      0.173
     0.235      0.047      0.020      0.015      0.011      0.073      0.072      0.019
     0.028      0.110      0.454
```

```
 100.000   100.000   100.000   100.000   100.000   100.000   100.000   100.000
 100.000   100.000   100.000   100.000   100.000   100.000   100.000   100.000
 100.000   100.000   100.000
1000.000  1000.000  1000.000  1000.000  1000.000  1000.000  1000.000  1000.000
1000.000  1000.000  1000.000  1000.000  1000.000  1000.000  1000.000  1000.000
1000.000  1000.000  1000.000
121111111
/*
//GO.FTC5F003 DD *
/*

(NEW PAGE)

*****  P001 FLIGHT PATH SCENARIO SUMMARY  *****

THE FLIGHT PATH CONSISTS OF 20 MILESTONES WITH A TOTAL FLIGHT TIME OF
114.5 SECONDS.  BOMB RELEASE IS AT MILESTONE 15.

*****  OPTION SUMMARY  *****

CRUISE SPEED IS 232.0 METERS PER SECOND.
A P001 INPUT LISTING IS PROVIDED AS OUTPUT.
A PUNCHED DECK IS PROVIDED AS OUTPUT.
A SCENARIO PLOT IS PROVIDED AS OUTPUT.
EXTENDEC PRINTOUT IS PROVIDED AS OUTPUT.
PRESET GUN EMPLACEMENT LOCATIONS ARE UTILIZED.
AN AIRBORNE JAMMER IS BEING UTILIZED.
JAMMER POWER IS 500.0 WATTS.
ANTI-JAM FEATURE IS UTILIZED WHERE APPRCPRIATE.
MULTIPATH RADAR EFFECTS ARE CONSIDERED.

*****  FLIGHT PATH ERRORS  *****

*****  NO FLIGHT PATH ERRORS IN THIS RUN  *****

*****  END OF P001 INPUT PROGRAM - SUMMARY COMPLETE  *****
```

APPENDIX D

P001 INPUT GUIDE CHANGES

Revisions to P001:

1. Delete card 7A and 7B.
2. Insert cards 13 and 14 as given on the following pages.
3. The following list is given as an aid to facilitate the assignment of valid combinations of gun type, mode and operating characteristics to the ECM and multipath options:

Gun Type (IGT)	Mode (IEM)	Radar ID (IRECM)	IRMP	Option
1	1	-	-	-
2	1	-	-	-
3	1	-	-	-
3	2	-	-	-
3	3	-	-	-
3	3	1	-	Jam
3	3	1	1	Jam, Multipath
3	4	-	-	-
3	4	1	-	Jam
4	1	-	-	-
5	1	-	-	-
5	2	-	-	-
5	3	-	-	-
5	3	2	-	Jam
5	3	2	2	Jam, Multipath
5	3	3	-	Jam, Anti-jam
5	3	3	2	Jam, Anti-jam, Multipath
5	3	4	-	Jam
5	3	4	3	Jam, Multipath
5	4	-	-	-
5	4	2	-	Jam
5	4	3	-	Jam, Anti-jam
5	4	4	-	Jam

Radar Multipath Input Parameters

CARD: 13

ID	PARA	UNITS	FORMAT	COLUMNS	DESCRIPTION
A	I	ND	I2	1-2	Data group identification code. I=13 indicates that the remainder of the card contains radar multipath parameters.
B	ICARD	ND	7A10,A8	3-80	Seventy-eight columns of alphameric data to be decoded and assigned as follows:
B1	IMUL	ND	I3	3-5	IMUL=0, no multipath. Turn off multipath if previously used. IMUL=1, multipath desired.
B2	IRMP	ND	I5	6-10	Radar type ID. Specifies the tracking radar.
B3	REFC	ND	F10.0	11-20	Reflection coefficient. 0.35 is a typical value for terrain with vegetation.

NOTE: Multipath effects can only be applied to a system with a Mode ID (IEM) of 3.

The value of IRMP selects the appropriate radar parameters:

IRMP	Beamwidth (deg)	Squint Angle (deg)	Calibration Constant
1	1.4	0.5	0.759
2	1.8	0.6	1.06
3	4.5	1.4	2.74

CARD: 13

Radar Multipath Input Parameters					CARD: 13
ID	PARA	UNITS	FORMAT	COLUMNS	DESCRIPTION
					The following table gives the relationship between the Radar ID (IRECM) and the corresponding radar parameters (IRMP):

Radar ID (IRECM)	IRMP
1	1
2,3	2
4	3

CARD: 13

ECM (Jamming) Input Parameters

CARD: 14

ID	PARA	UNITS	FORMAT	COLUMNS	DESCRIPTION
A	I	ND	I2	1-2	Data group identification code. I=14 indicates that the remainder of the card contains ECM parameters.
B	ICARD	ND	7A10,A8	3-80	Seventy-eight columns of alphameric data to be decoded and assigned as follows:
B1	IJAM	ND	I3	3-5	Jamming switch. 0=no jamming; 1=jamming; card must be reread with IJAM=0 to turn jamming off.
B2	IP	ND	I3	6-8	IP=0, no J/S printout. IP=n, print every nth value.
B3	IJ	ND	I2	9-10	IJ=0; then GAINJ is antenna gain of jammer.
B4	GAINJ	ND	F10.0	11-20	IJ=1; a 37x37 5^{o} jammer table follows. Gain is in dB.
B5	PJW	watts	F10.0	21-30	Jammer power in watts.
B6	PLEN	sec	F10.0	31-40	Length of jammer cover pulse. Needed when IRECM=3. 1 microsecond is a standard value.
B7	IX	ND	I5	41-45	IX=0; no cross section table is needed.
B8	XSEC	m^2	F10.0	46-55	A constant cross section of XSEC m^2 is used.
B9	CALX	ND	F10.0	56-65	IX=1, a cross section table will be read following the 14 card and a possible jammer table. The cross section table values will be multiplied by CALX. This allows the user to scale the cross section. If not used, it must be set to 1.

CARD: 14

ECM (Jamming) Input Parameters

CARD: 14

<table>
<tr><th>ID</th><th>PARA</th><th>UNITS</th><th>FORMAT</th><th>COLUMNS</th><th>DESCRIPTION</th></tr>
<tr><td>B10</td><td>IRECM</td><td>ND</td><td>I5</td><td>66-70</td><td>Radar type. This index calls up the following constants from a data statement:
<table>
<tr><th>IRECM</th><th>Gain (RGDB)</th><th>Power (PRW)</th><th>Frequency (FREQ)</th><th>SJTMAX*</th></tr>
<tr><td>1</td><td>40.0 dB</td><td>150,000</td><td>15.1E9</td><td>3 dB</td></tr>
<tr><td>2,3</td><td>38.5 dB</td><td>175,000</td><td>9.38E9</td><td>1.5, 17 dB</td></tr>
<tr><td>4</td><td>28.0 dB</td><td>250,000</td><td>2.838E9</td><td>0 dB</td></tr>
</table>
*SJTMAX must be entered as in B11.</td></tr>
<tr><td>B11</td><td>SJTMAX</td><td>dB</td><td>F10.0</td><td>71-80</td><td>Threshold where tracking errors become significant. (dB)

NOTE: The following table summarizes the valid combinations of radars, gun types and tracking modes:
<table>
<tr><th>Radar ID (IRECM)</th><th>Gun ID (IGT)</th><th>Mode ID (IEM)</th></tr>
<tr><td>1</td><td>3</td><td>3,4</td></tr>
<tr><td>2,3</td><td>5</td><td>3,4</td></tr>
<tr><td>4</td><td>5</td><td>3,4</td></tr>
</table>
The two ID's on the second radar indicate the anti-jam capability.
IRECM = 2, anti-jam off
IRECM = 3, anti-jam on</td></tr>
</table>

CARD: 14

APPENDIX E

JCL CARD SETUPS FOR REFERENCES

THE FOLLOWING CARDS ARE THE SETUP TO RUN THE P001 INPUT PROGRAM (PIP)
FROM BATCH, UTILIZING THE CALCOMP PLOTTER:

```
//   ( GREEN JOB CARD )
// EXEC FORTCLGP
//FTC7FC01 DD SYSCUT=B
//FORT.SYSIN DD *
  ( PROGRAM SCURCE CARDS GO HERE        )
/*
//GO.SYSIN DD *
  ( DATA DECK GOES HERE      )
/*
```

THE FOLLOWING CARCS ARE THE SETUP TO RUN THE P001 INPUT PRCGRAM (PIP) FROM BATCH, UTILIZING THE VERSATEC PLOTTER:

```
//   ( GREEN JOB CARD )
//   EXEC FORTCLGV
//FCRT.SYSIN DD *
  ( PROGRAM SCURCE CARDS GO HERE        )
/*
//GC.FTC7F001 DD  SYSOUT=B
//GO.SYSIN DD *
  ( DATA DECK GOES HERE       )
/*
```

THE FOLLOWING CARCS ARE THE SETUP TO CREATE A LOAC MODULE FOR THE PC01
INPUT PROGRAM (PIP):

```
//   ( GREEN JOB CARD )
// EXEC NVTECLNK
//FORT.SYSIN DD *
  ( PROGRAM SOURCE CARDS GO HERE       )
/*
//LINK.SYSLMOD DD DSN=F0559.PIP,SPACE=(CYL,(2,1,1)),
// UNIT=3330,VOL=SER=DISK02,DISP=(NEW,KEEP),
// LABEL=EXPDT=99360
//LINK.SYSIN DD *
 ENTRY MAIN
 NAME PIP(R)
/*
```

THE FOLLCWING CARCS ARE THE SETUP TO RUN THE P001 INPUT PROGRAM (PIP)
FROM A LOAD MODULE, UTILIZING THE VERSATEC PLOTTER.

```
//   ( GREEN JOB CARD )
// EXEC NVTECGO,NAME=PIP,REGION=200K
//STEPLIB DD DSN=F0559.PIP,UNIT=3330,VOL=SER=DISK02,DISP=SHR
//FT06F001 DD SYSOUT=A,DCB=(RECFM=FBA,LRECL=133,BLKSIZE=3325)
//GO.FT07F001 DD  SYSOUT=B
//GO.SYSIN DD *
  ( CATA DECK GOES HERE       )
/*
```

THE FOLLOWING CARCS ARE THE SETUP TO REMOVE THE PC01 INPUT PROGRAM
(PIP) FROM DISK 02:

```
//(   JOE CARD  )
//SCRATCH EXEC PGM=IEHPROGM
//SYSPRINT DD SYSCUT=A
//DD1 DD UNIT=3330,VOL=SER=DISK02,DISP=CLD
//SYSIN DD *
 SCRATCH DSNAME=F0559.PIP,VOL=3330=DISK02,PURGE
/*
```

THE FOLLOWING CARCS ARE THE SETUP TO RUN THE IMPRCVED P001 AAA SIMULATICN PROGRAM (P1EW) FRCM BATCH:

```
//   ( GREEN JOB CARD )
//     EXEC   FORTCLG,REGICN.GO=250K
//FORT.SYSIN DD *
   ( FROGRAM SOURCE CARDS GO HERE        )
/*
//GO.FTC4F001 DD UNIT=SYSDA,SPACE=(CYL,(1,1)),
//   DCB=(RECFM=VBS,LRECL=404,BLKSIZE=3236)
//GO.FTC7F001 DD UNIT=SYSDA,SPACE=(CYL,(1,1)),
//   DCB=(RECFM=VBS,LRECL=404,BLKSIZE=3236)
//GO.FTC8F001 DD UNIT=SYSDA,SPACE=(CYL,(1,1)),
//   DCB=(RECFM=VBS,LRECL=404,BLKSIZE=3236)
//GO.FTC9F001 DD UNIT=SYSDA,SPACE=(CYL,(1,1)),
//   DCB=(RECFM=VBS,LRECL=404,BLKSIZE=3236)
//GO.FT11F001 DD UNIT=SYSDA,SPACE=(CYL,(1,1)),
//   DCB=(RECFM=VBS,LRECL=404,BLKSIZE=3236)
//GO.FTC5F001 DD *
   ( CATA DECK GOES HERE        )
/*
```

THE FOLLOWING CARCS ARE THE SETUP TO CREATE A LOAC MODULE FCR THE IMPROVEC P001 AAA SIMULATION PROGRAM (P1EW):

```
//    ( GREEN JOB CARD )
// EXEC FORTCL
//FCRT.SYSIN DD *
  ( PROGRAM SOURCE CARDS GO HERE        )
/*
//LINK.SYSLMOD DD DSN=F0559.P1EW,SPACE=(CYL,(2,1,1)),
// UNIT=3330,VOL=SER=DISK02,DISP=(NEW,KEEP),
// LABEL=EXPDT=99360
//LINK.SYSIN DD *
 ENTRY MAIN
 NAME P1EW(R)
/*
```

THE FOLLOWING CARCS ARE THE SETUP TO RUN THE IMPRCVED P001 AAA SIMULATICN
PROGRAM (P1EW) FRCM A LOAC MODULE:

```
//   ( GREEN JOB CARD )
// EXEC PGM=P1EW,REGION=200K
//STEPLIB DD DSN=F0559.P1EW,UNIT=3330,VCL=SER=DISK02,DISP=SHR
//FT06FC01 DD SYSOUT=A,DCB=(RECFM=FBA,LRECL=133,BLKSIZE=3325)
//GO.FT04F001 DD UNIT=SYSDA,SPACE=(CYL,(1,1)),
//   DCB=(RECFM=VBS,LRECL=404,BLKSIZE=3236)
//GO.FTC7F001 DD UNIT=SYSDA,SPACE=(CYL,(1,1)),
//   DCB=(RECFM=VBS,LRECL=404,BLKSIZE=3236)
//GO.FTC8F001 DD UNIT=SYSDA,SPACE=(CYL,(1,1)),
//   DCB=(RECFM=VBS,LRECL=404,BLKSIZE=3236)
//GO.FTC9F001 DD UNIT=SYSDA,SPACE=(CYL,(1,1)),
//   DCB=(RECFM=VBS,LRECL=404,BLKSIZE=3236)
//GO.FT11F001 DD UNIT=SYSDA,SPACE=(CYL,(1,1)),
//   DCB=(RECFM=VBS,LRECL=404,BLKSIZE=3236)
//GC.FTC5F001 DD *
  ( DATA DECK GOES HERE      )
/*
```

THE FOLLCWING CARCS ARE THE SETUP TO REMCVE P1EW FROM DISK 02:

```
//(   JOB CARD   )
//SCRATCH EXEC PGM=IEHPROGM
//SYSPRINT DD SYSCUT=A
//DD1 DD UNIT=3330,VOL=SER=DISK02,DISP=CLD
//SYSIN DD *
 SCRATCH DSNAME=F0559.P1EW,VOL=3330=DISK02,PURGE
/*
```

APPENDIX F

P001 ANALYSIS OUTPUT

MASK ANGLE FOR THIS RUN = 0.0 CEG.

TIME	XXX	YYY	ZZZ	SPEED	XDOT	YDOT	ZDOT	HEADING	CLIMB	ROLL
0.0	0.0	500.0	457.0	231.99	231.30	-16.90	-5.70	-4.20	-1.40	0.0
1.38	317.9	476.8	449.2	232.06	231.39	-16.90	-3.96	-4.20	-0.96	4.96
2.75	635.9	453.7	441.4	232.14	231.48	-16.90	-2.21	-4.20	-0.53	9.91
4.13	953.8	430.5	433.6	232.22	231.58	-16.90	-0.47	-4.20	-0.09	14.87
5.51	1271.6	407.3	425.8	232.30	231.67	-16.90	1.27	-4.20	0.34	19.82
6.88	1592.2	404.6	424.7	232.29	231.72	-13.37	0.03	-3.22	0.03	11.62
8.26	1914.0	413.4	427.3	232.24	231.74	-7.87	-2.89	-1.94	-0.71	-3.94
9.63	2235.8	422.2	429.9	232.20	231.76	-2.36	-5.31	-0.57	-1.44	-19.51
11.01	2557.6	431.0	432.5	232.15	231.75	3.14	-9.73	0.81	-2.19	-35.23
12.39	2874.9	407.5	427.9	232.13	231.35	0.73	-8.54	0.21	-2.13	-33.39
13.76	3186.3	340.8	413.7	232.31	230.31	-12.32	-4.17	-3.04	-1.04	-10.54
15.14	3497.6	274.2	399.4	232.45	229.27	-25.33	0.20	-6.29	0.05	12.90
16.52	3809.0	207.5	385.2	232.59	228.22	-38.43	4.56	-9.54	1.14	36.35
17.89	4121.2	164.1	376.3	232.66	227.53	-44.73	7.73	-11.12	1.93	51.30
19.27	4436.6	206.8	387.3	232.53	228.14	-26.12	6.47	-6.50	1.60	35.39
20.65	4752.0	249.5	398.3	232.39	228.74	-7.90	5.21	-1.88	1.29	19.37
22.02	5067.4	292.2	409.2	232.25	229.35	11.11	3.95	2.74	0.95	3.38
23.40	5382.8	334.9	420.2	232.12	229.96	29.73	2.69	7.36	0.62	-12.62
24.78	5704.1	360.0	424.3	232.07	230.24	28.00	-0.06	6.93	-0.04	-17.19
26.15	6025.9	383.7	427.9	232.02	230.50	24.65	-2.93	6.10	-0.73	-20.34
27.53	6347.7	407.4	431.4	231.98	230.76	21.31	-5.80	5.27	-1.41	-24.49
28.90	6669.5	431.2	435.0	231.93	231.02	17.96	-8.67	4.44	-2.10	-29.15
30.28	6989.2	423.2	426.7	232.02	231.25	11.66	-7.04	2.88	-1.70	-17.10
31.66	7308.1	402.4	413.6	232.17	231.46	4.18	-3.59	1.04	-0.85	-0.11
33.03	7627.1	381.7	400.6	232.32	231.67	-3.31	-0.13	-0.80	-0.02	16.87
34.41	7946.0	360.9	387.5	232.47	231.68	-10.80	3.32	-2.64	0.92	33.85
35.79	8261.6	372.1	383.1	232.51	231.67	-9.82	5.38	-2.39	1.32	43.43
37.16	8572.7	426.2	390.3	232.41	230.91	2.57	5.56	0.63	1.36	43.02
38.54	8883.9	480.4	397.5	232.31	230.14	14.95	5.74	3.74	1.41	42.61
39.92	9195.0	534.5	404.7	232.22	229.37	27.34	5.92	6.81	1.45	42.21
41.29	9506.2	588.7	412.0	232.12	228.60	39.73	6.10	9.88	1.50	41.80
42.67	9800.0	712.6	420.3	232.03	225.07	51.51	5.01	12.92	1.22	45.25
44.04	10093.7	837.0	428.7	231.93	221.53	63.29	3.91	15.95	0.94	48.73
45.42	10387.4	961.3	437.1	231.84	217.58	75.07	2.82	18.98	0.66	52.21
46.80	10681.1	1085.6	445.5	231.75	214.44	86.86	1.72	22.01	0.37	55.69
48.17	10926.9	1280.2	449.4	231.73	185.04	85.73	42.27	27.15	13.06	44.74
49.55	11152.5	1503.7	451.3	231.73	144.96	79.39	100.02	33.15	31.04	27.84
50.93	11378.9	1727.2	453.2	231.74	104.88	73.01	157.79	39.15	49.05	10.94
52.30	11594.7	1940.4	475.4	231.25	68.82	69.04	209.81	44.65	64.94	-4.66
53.68	11683.8	2025.2	747.8	224.64	82.45	80.54	176.94	44.47	55.87	-4.10
55.06	11772.6	2110.1	1020.2	213.04	96.08	93.04	145.08	44.26	44.80	-3.55
56.43	11861.9	2195.0	1292.7	211.43	109.71	105.54	113.21	44.05	34.72	-3.00
57.81	11951.0	2279.9	1565.1	204.83	123.34	118.05	81.34	43.84	24.65	-2.44
59.19	12040.1	2364.8	1837.5	199.22	136.97	130.55	49.47	43.63	14.57	-1.89
60.56	12217.9	2530.7	1931.9	198.00	140.76	133.45	34.96	43.48	10.22	8.07
61.94	12412.0	2711.6	1993.3	198.96	142.72	134.58	23.65	43.33	6.93	19.63
63.31	12606.2	2892.5	2054.7	199.92	144.65	135.72	12.35	43.18	3.63	31.32
64.69	12800.4	3073.4	2116.2	200.87	146.66	136.85	1.04	43.03	0.34	42.92
66.07	12956.2	3301.1	2125.3	202.24	135.83	142.50	-11.55	45.60	-3.22	42.57
67.44	13105.5	3542.4	2126.2	203.73	130.45	149.47	-24.52	48.56	-6.85	38.65
68.82	13252.9	3783.7	2124.0	205.21	121.08	156.44	-37.49	52.21	-10.49	34.74
70.20	13400.2	4025.0	2121.9	206.70	111.70	163.41	-50.46	55.67	-14.12	30.82
71.57	13542.4	4266.3	2109.1	208.25	102.32	169.68	-62.50	58.63	-17.59	28.01
72.95	13649.5	4525.5	2022.4	210.27	96.54	171.12	-71.67	60.63	-19.94	22.88

AFATL P-001 AAASIM * AIRCRAFT COMBAT SURVIVABILITY SCENARIO * PAGE 2

TIME	XXX	YYY	ZZZ	SPEED	XDOT	YDOT	ZDOT	HEADING	CLIMB	ROLL
74.33	13755.5	4782.7	1925.7	212.30	50.36	172.56	-90.45	62.44	-22.28	37.75
75.70	13863.5	5039.9	1849.0	214.32	84.17	173.99	-89.22	64.25	-24.62	42.62
77.08	13970.6	5297.1	1762.3	216.35	77.99	175.43	-97.59	66.06	-26.96	47.45
78.45	14052.3	5557.7	1653.9	218.46	70.15	178.81	-101.98	68.41	-27.95	45.20
79.83	14061.1	5828.1	1512.1	220.81	57.72	187.79	-92.19	72.71	-25.02	22.29
81.21	14070.0	6098.4	1364.3	223.15	45.26	196.76	-82.41	76.21	-22.10	-0.62
82.58	14079.9	6368.8	1216.4	225.50	32.60	205.74	-72.62	60.11	-19.18	-23.53
83.96	14087.7	6635.2	1068.6	227.85	20.34	214.71	-62.84	64.02	-16.26	-46.49
85.34	14095.6	6909.6	920.8	230.20	7.87	223.69	-53.05	67.52	-13.33	-69.25
86.71	14330.2	7100.7	844.3	231.10	47.13	206.21	-42.21	76.65	-10.57	-62.57
88.09	14574.6	7300.4	771.2	231.92	88.87	167.47	-31.32	65.05	-7.32	-54.36
89.47	14819.1	7494.0	698.1	232.75	130.61	168.72	-20.42	52.26	-5.07	-46.14
90.84	15063.5	7687.7	625.0	233.58	172.35	149.97	-9.53	41.46	-2.32	-37.92
92.22	15335.7	7850.4	599.2	233.81	186.66	137.79	-7.75	36.04	-1.36	-24.07
93.60	15617.6	8002.2	590.0	233.83	191.23	132.62	-9.17	34.73	-2.22	-8.22
94.97	15899.6	8154.0	580.9	233.85	196.00	125.44	-10.59	32.83	-2.57	7.63
96.35	16181.6	8305.8	571.7	233.88	200.67	116.27	-12.00	30.52	-2.93	23.49
97.72	16463.5	8457.7	562.5	233.90	205.34	111.09	-13.42	28.42	-3.28	39.32
99.10	16707.1	8668.9	544.4	233.98	199.50	115.71	-11.36	30.93	-2.78	45.72
100.48	16948.5	8883.6	525.8	234.08	193.04	129.23	-9.05	32.82	-2.23	51.57
101.85	17169.5	9098.4	507.1	234.17	186.58	136.76	-6.83	36.66	-1.68	57.41
103.23	17431.3	9313.1	483.5	234.26	180.12	148.29	-4.56	39.43	-1.13	63.26
104.61	17631.3	9550.3	473.2	234.32	168.76	159.23	-2.65	43.51	-0.65	66.21
105.98	17686.8	9866.3	469.3	234.25	140.25	175.06	-2.00	51.82	-0.49	59.08
107.36	17742.3	10182.2	465.5	234.19	111.75	190.90	-1.34	59.73	-0.32	51.94
108.74	17797.6	10498.1	461.7	234.13	83.25	206.74	-0.66	67.64	-0.15	44.90
110.11	17853.3	10814.1	457.9	234.06	54.75	222.58	-0.03	75.55	0.02	37.67
111.49	17879.4	11134.7	456.2	233.98	40.48	230.45	0.25	80.00	0.08	28.09
112.86	17876.2	11460.1	456.5	233.87	40.45	230.34	0.14	80.00	0.05	16.05
114.24	17873.1	11785.5	456.9	233.76	40.41	230.24	0.04	80.00	0.01	4.01

XR= 0.0 YR= 0.0 XT= 0.0 YT= 0.0 PSI= 0.0 CZ= 0.0

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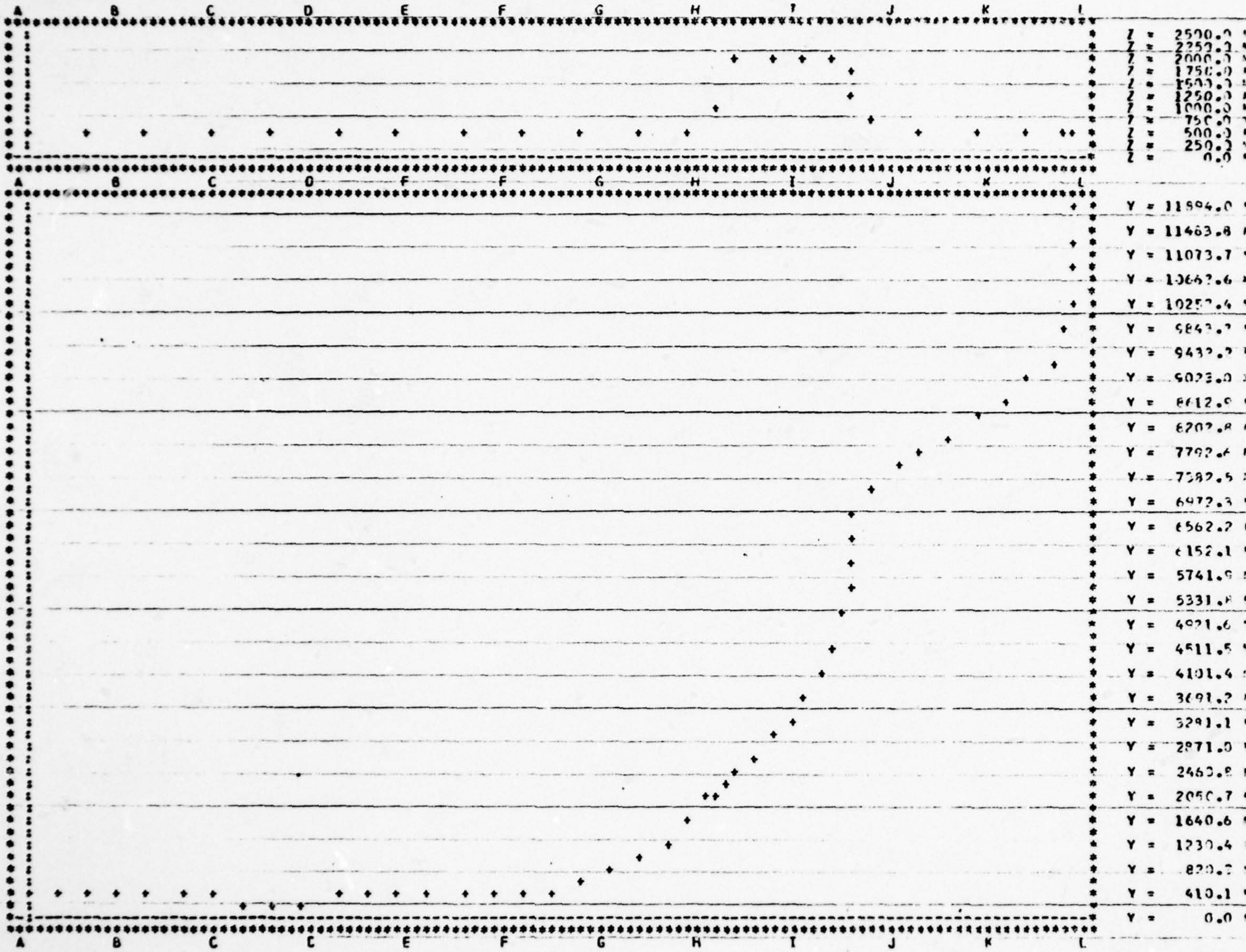
AFATL P-001 AAASIM * AIRCRAFT COMBAT SURVIVABILITY SCENARIO PAGE 3



X(A)= -84.4 M X(B)= 1556.2 M X(C)= 3196.7 M X(D)= 4837.3 M X(E)= 6477.8 M X(F)= 8118.4 M X(G)= 9758.9 M
X(H)= 11399.5 M X(I)= 13040.0 M X(J)= 14680.6 M X(K)= 16321.1 M X(L)= 17961.7 M DX = 164.1 M DY = 205.1 M

10 TIME INTERVALS FOR PK ACCUMULATION

0.00 11.47 22.95 34.42 45.89 57.37 68.84 80.31 91.78 103.26 999.99

VULNERABLE AREA (SQ. METERS) AS A FUNCTION OF IMPACT SPEED (METERS/SEC) AND ASPECT VIEW
VULNERABLE AREA TABLE VS TYPE 1 AND 2 WEAPONS

VIEW	0	152	305	457	610	762	914	1067	1219
1	0.00	0.46	0.46	7.11	7.11	7.11	7.11	7.11	7.11
2	0.00	0.66	0.66	5.55	5.55	5.55	5.55	5.55	5.55
3	0.00	0.70	0.70	5.57	5.57	5.57	5.57	5.57	5.57
4	0.00	0.66	0.66	7.36	7.36	7.36	7.36	7.36	7.36
5	0.00	0.70	0.70	5.57	5.57	5.57	5.57	5.57	5.57
6	0.00	0.66	0.66	5.55	5.55	5.55	5.55	5.55	5.55
7	0.00	0.70	0.70	5.57	5.57	5.57	5.57	5.57	5.57
8	0.00	0.66	0.66	7.36	7.36	7.36	7.36	7.36	7.36
9	0.00	0.70	0.70	5.57	5.57	5.57	5.57	5.57	5.57
10	0.00	0.46	0.46	0.74	0.74	0.74	0.74	0.74	0.74
11	0.00	0.66	0.66	2.86	2.86	2.86	2.86	2.86	2.86
12	0.00	0.46	0.46	3.30	3.30	3.30	3.30	3.30	3.30
13	0.00	0.66	0.66	2.86	2.86	2.86	2.86	2.86	2.86
14	0.00	0.46	0.46	0.74	0.74	0.74	0.74	0.74	0.74
15	0.00	0.66	0.66	2.86	2.86	2.86	2.86	2.86	2.86
16	0.00	0.46	0.46	3.30	3.30	3.30	3.30	3.30	3.30
17	0.00	0.66	0.66	2.86	2.86	2.86	2.86	2.86	2.86
18	0.00	0.66	0.66	5.55	5.55	5.55	5.55	5.55	5.55
19	0.00	0.70	0.70	5.57	5.57	5.57	5.57	5.57	5.57
20	0.00	0.66	0.66	7.36	7.36	7.36	7.36	7.36	7.36
21	0.00	0.70	0.70	5.57	5.57	5.57	5.57	5.57	5.57
22	0.00	0.66	0.66	5.55	5.55	5.55	5.55	5.55	5.55
23	0.00	0.70	0.70	5.57	5.57	5.57	5.57	5.57	5.57
24	0.00	0.66	0.66	7.36	7.36	7.36	7.36	7.26	7.36
25	0.00	0.70	0.70	5.57	5.57	5.57	5.57	5.57	5.57
26	0.00	0.46	0.46	7.11	7.11	7.11	7.11	7.11	7.11

G T	TIME/ ROUND	MIN ELEV	MAX ELEV	AZIM RATE	ELEV RATE	MAX TOF1	MAX TOF2	MUZZ VEL	BALLISTIC CONSTANT 1	BALLISTIC CONSTANT 2	VEL MIN	VEL MAX	RANGE MIN	RANGE MAX	SMOOTH CONST	MAX.AZ ERROR	MAX.EL ERROR
1	0.750	-10.00	85.00	30.00	25.00	1.60	99.99	840.	0.1802050	0.0123920	0.0	300.0	0.	3000.	9999.99	5.730	5.730
2	0.400	-8.50	90.00	30.00	25.00	2.20	99.99	1000.	0.2514990	-0.0062590	0.0	300.0	400.	3000.	9999.99	5.730	5.730
3	0.200	-10.00	85.00	80.00	45.00	3.80	7.50	930.	0.2299600	-0.0068890	0.0	350.0	500.	3300.	1.33	5.730	5.730
4	0.750	-5.00	85.00	30.00	20.00	4.10	99.99	880.	0.0393210	0.0042620	0.0	250.0	0.	5000.	9999.99	5.730	5.730
5	0.857	-4.00	87.00	30.00	18.00	6.20	11.60	960.	0.0784500	-0.0004210	0.0	300.0	0.	5500.	1.33	5.730	5.730
6	4.000	-3.00	82.00	30.00	20.00	99.99	19.20	800.	0.0506540	-0.0003570	999.9	999.9	99999.	99999.	1.33	5.730	5.730

```
AFATL P-001 AAASIM *  AIRCRAFT COMBAT SURVIVABILITY SCENARIO                    *                    PAGE   5

ECM INPUTS (INITIAL OR CHANGED)

IP =             5
IJ =             0
GAINJ(DB) =    1.00
PJW(W) =     500.00
PLEN(S) =  0.0
IX =             1
XSEC(SQM) =     0.0
CALX =          1.000
IRECM =          1
SJTMAX(DB) =   3.00

JAMMER ANTENNA GAIN  1.000 DB

AIRCRAFT CROSS SECTION TABLE SPECIFIED.  PRINTED VALUES WILL BE MULTIPLIED BY CALX. CALX=      1.00
```

TABLE DATA

19 ELEMENTS FROM	0.0	TC	180.00	EY	10.00	AZ
7 ELEMENTS FROM.	-90.00	TC	90.00	EY	30.00	EL
ELSEWHERE TABLE IS	1000.00					

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RCS MATRIX

ELEV	0	10	20	30	40	50	60	70	80	90	100	110	120
-120.0	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00
-90.0	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00
-60.0	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
-30.0	0.27	0.18	0.05	0.02	0.16	0.17	0.06	0.17	0.22	0.05	0.02	0.01	0.01
0.0	0.00	0.00	0.01	0.01	0.09	0.09	0.04	0.07	0.11	0.03	0.02	0.01	0.01
30.0	0.27	0.18	0.05	0.02	0.16	0.17	0.06	0.17	0.22	0.05	0.02	0.01	0.01
60.0	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
90.0	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00
120.0	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00

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RCS MATRIX

ELEV	130	140	150	160	170	180
-120.0	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00
-90.0	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00
-60.0	100.00	100.00	100.00	100.00	100.00	100.00
-30.0	0.07	0.07	0.02	0.03	0.11	0.45
0.0	0.03	0.03	0.02	0.03	0.10	0.51
30.0	0.07	0.07	0.02	0.03	0.11	0.45
60.0	100.00	100.00	100.00	100.00	100.00	100.00
90.0	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00
120.0	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00

VULNERABLE AREA (SQ. METERS) AS A FUNCTION OF IMPACT SPEED (METERS/SEC) AND ASPECT VIEW
VULNERABLE AREA TABLE VS TYPE 3 WEAPONS

VIEW	0	152	305	457	610	762	914	1067	1219
1	0.00	12.54	12.54	13.47	13.47	13.47	13.47	13.47	13.47
2	0.00	9.85	9.85	10.51	10.51	10.51	10.51	10.51	10.51
3	0.00	9.64	9.64	11.15	11.15	11.15	11.15	11.15	11.15
4	0.00	12.64	12.64	14.78	14.78	14.78	14.78	14.78	14.78
5	0.00	9.64	9.64	11.15	11.15	11.15	11.15	11.15	11.15
6	0.00	9.85	9.85	10.51	10.51	10.51	10.51	10.51	10.51
7	0.00	9.64	9.64	11.15	11.15	11.15	11.15	11.15	11.15
8	0.00	12.64	12.64	14.78	14.78	14.78	14.79	14.78	14.78
9	0.00	9.64	9.64	11.15	11.15	11.15	11.15	11.15	11.15
10	0.00	1.39	1.39	1.39	1.39	1.39	1.39	1.39	1.39
11	0.00	4.76	4.76	6.24	6.24	6.24	6.24	6.24	6.24
12	0.00	5.34	5.34	7.43	7.43	7.43	7.43	7.43	7.43
13	0.00	4.76	4.76	6.24	6.24	6.24	6.24	6.24	6.24
14	0.00	1.39	1.39	1.39	1.39	1.39	1.39	1.39	1.39
15	0.00	4.76	4.76	6.24	6.24	6.24	6.24	6.24	6.24
16	0.00	5.34	5.34	7.43	7.43	7.43	7.43	7.43	7.43
17	0.00	4.76	4.76	6.24	6.24	6.24	6.24	6.24	6.24
18	0.00	9.85	9.85	10.51	10.51	10.51	10.51	10.51	10.51
19	0.00	9.64	9.64	11.15	11.15	11.15	11.15	11.15	11.15
20	0.00	12.64	12.64	14.78	14.78	14.78	14.78	14.78	14.78
21	0.00	9.64	9.64	11.15	11.15	11.15	11.15	11.15	11.15
22	0.00	9.65	9.85	10.51	10.51	10.51	10.51	10.51	10.51
23	0.00	9.64	9.64	11.15	11.15	11.15	11.15	11.15	11.15
24	0.00	12.64	12.64	14.78	14.78	14.78	14.78	14.78	14.78
25	0.00	9.64	9.64	11.15	11.15	11.15	11.15	11.15	11.15
26	0.00	12.54	12.54	13.47	13.47	13.47	13.47	13.47	13.47

```
MULTIPATH INPUTS (INITIAL OR CHANGED)

IAMP =         1
REFC =     0.350
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```
MULTIPATH INPUTS (INITIAL CR CHANGEC

IRMP =          2
REFC =      0.350


ECM INPUTS (INITIAL OR CHANGEC)

IP =            5
IJ =            0
GAINJ(DB) =   1.00
PJ(W) =     500.00
PLEN(S) =  0.0
IX =            1
XSEC(SCM) =     0.0
CALX =          1.000
IRECM =         3
SJTMAX(DB) =  17.00


JAMMER ANTENNA GAIN  1.000 DB

AIRCRAFT CROSS SECTION TABLE SPECIFIED.  PRINTEC VALUES WILL BE MULTIPLIED BY CALX. CALX=       1.00
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TABLE DATA
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    7 ELEMENTS FROM     -50.00 TO      90.00 BY      30.00  EL
 ELSEWHERE TABLE IS    1000.00
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AD-A057 907 NAVAL POSTGRADUATE SCHOOL MONTEREY CALIF F/G 19/5
ADAPTATION OF THE IMPROVED ANTIAIRCRAFT ARTILLERY SIMULATION CO--ETC(U)
MAR 78 C F SWENSON

UNCLASSIFIED NL

2 OF 3
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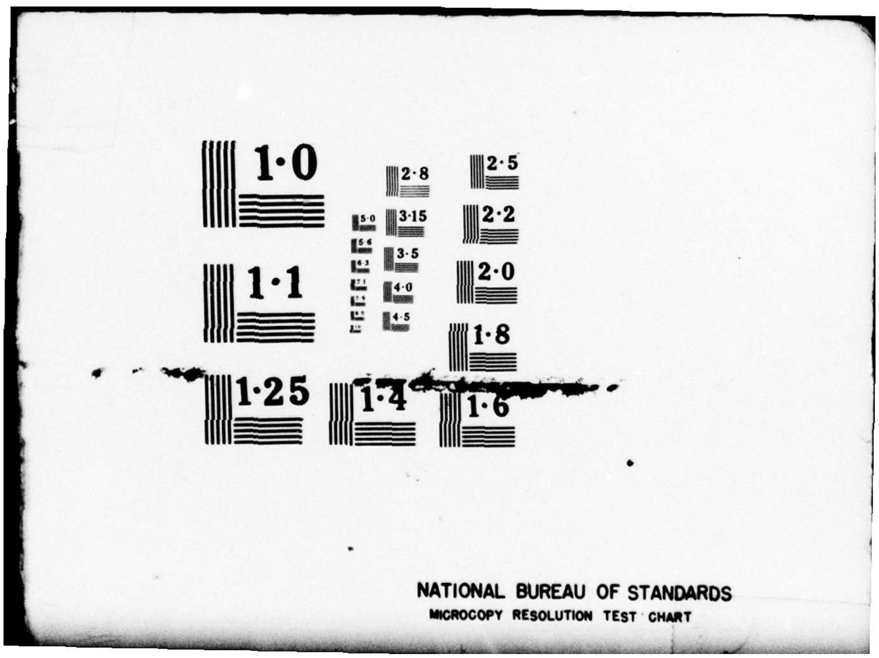
057907


1·0
2·8
2·5
3·15
2·2
3·5
2·0
4·0
1·1
4·5
1·8
1·25
1·4
1·6
NATIONAL BUREAU OF STANDARDS
MICROCOPY RESOLUTION TEST CHART

RCS MATRIX

ELEV	0	10	20	30	40	50	60	70	80	90	100	110	120
-120.0	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00
-90.0	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00
-60.0	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
-30.0	0.27	0.18	0.05	0.02	0.16	0.17	0.06	0.17	0.22	0.05	0.02	0.01	0.01
0.0	0.00	0.00	0.01	0.01	0.09	0.09	0.04	0.07	0.11	0.03	0.02	0.01	0.01
30.0	0.27	0.18	0.05	0.02	0.16	0.17	0.06	0.17	0.22	0.05	0.02	0.01	0.01
60.0	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
90.0	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00
120.0	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00

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BCS MATRIX

ELEV	130	140	150	160	170	180
-120.0	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00
-90.0	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00
-60.0	100.00	100.00	100.00	100.00	100.00	100.00
-30.0	0.07	0.07	0.02	0.03	0.11	0.45
0.0	0.03	0.03	0.02	0.03	0.10	0.51
30.0	0.07	0.07	0.02	0.03	0.11	0.45
60.0	100.00	100.00	100.00	100.00	100.00	100.00
90.0	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00
120.0	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00

VULNERABLE AREA (SQ. METERS) AS A FUNCTION OF IMPACT SPEED (METERS/SEC) AND ASPECT VIEW
VULNERABLE AREA TABLE VS TYPE 5 WEAPON

VIEW	0	152	305	457	610	762	914	1067	1219
1	0.00	55.37	55.37	55.37	55.37	55.37	55.37	55.37	55.37
2	0.00	43.22	43.22	43.22	43.22	43.22	43.22	43.22	43.22
3	0.00	47.10	47.10	47.10	47.10	47.10	47.10	47.10	47.10
4	0.00	62.53	62.53	62.53	62.53	62.53	62.53	62.53	62.53
5	0.00	47.10	47.10	47.10	47.10	47.10	47.10	47.10	47.10
6	0.00	43.22	43.22	43.22	43.22	43.22	43.22	43.22	43.22
7	0.00	47.10	47.10	47.10	47.10	47.10	47.10	47.10	47.10
8	0.00	62.53	62.53	62.53	62.53	62.53	62.53	62.53	62.53
9	0.00	47.10	47.10	47.10	47.10	47.10	47.10	47.10	47.10
10	0.00	5.76	5.76	5.76	5.76	5.76	5.76	5.76	5.76
11	0.00	27.45	27.45	27.45	27.45	27.45	27.45	27.45	27.45
12	0.00	33.07	33.07	33.07	33.07	33.07	33.07	33.07	33.07
13	0.00	27.45	27.45	27.45	27.45	27.45	27.45	27.45	27.45
14	0.00	5.76	5.76	5.76	5.76	5.76	5.76	5.76	5.76
15	0.00	27.45	27.45	27.45	27.45	27.45	27.45	27.45	27.45
16	0.00	33.07	33.07	33.07	33.07	33.07	33.07	33.07	33.07
17	0.00	27.45	27.45	27.45	27.45	27.45	27.45	27.45	27.45
18	0.00	5.76	5.76	5.76	5.76	5.76	5.76	5.76	5.76
19	0.00	47.10	47.10	47.10	47.10	47.10	47.10	47.10	47.10
20	0.00	62.53	62.53	62.53	62.53	62.53	62.53	62.53	62.53
21	0.00	47.10	47.10	47.10	47.10	47.10	47.10	47.10	47.10
22	0.00	43.22	43.22	43.22	43.22	43.22	43.22	43.22	43.22
23	0.00	47.10	47.10	47.10	47.10	47.10	47.10	47.10	47.10
24	0.00	62.53	62.53	62.53	62.53	62.53	62.53	62.53	62.53
25	0.00	47.10	47.10	47.10	47.10	47.10	47.10	47.10	47.10
26	0.00	55.37	55.37	55.37	55.37	55.37	55.37	55.37	55.37

LOC	P(KILL)	ROUNDS	FIRE TIME	XGUN	YGUN	ZGUN	RADIUS	GL	T REACT	T TRACK	CT	CH	CM	SB	LOC
1	0.0	3	3.0	14800.00	9000.00	40.00	0.0	1	0.0	2.50	1	1	1	1	1
2	0.0010946	7	5.25	16200.00	8200.00	40.00	0.0	1	0.0	2.50	1	1	1	1	2
3	0.0003691	17	6.80	13600.00	7200.00	20.00	0.0	1	0.0	2.50	2	1	1	1	3
4	0.0	0	0.0	13400.00	8000.00	20.00	0.0	1	0.0	2.50	2	1	1	1	4
5	0.0	0	0.0	11300.00	9700.00	50.00	0.0	1	0.0	6.00	3	4	4	1	5
6	0.0112359	422	21.10	15600.00	10900.00	90.00	0.0	1	0.0	6.00	3	3	4	1	6
7	0.0684375	134	57.42	12800.00	7500.00	20.00	0.0	1	0.0	6.00	5	3	2	1	7

ATTRITION ACCRUED AS A FUNCTION OF TIME OF FIRE

TIME SEG.	CUM FOR CLASS 1	DENSITY CLASS 1	DENSITY CLASS 2	DENSITY CLASS 3	DENSITY CLASS 4	DENSITY CLASS 5	DENSITY CLASS 6	DENSITY CLASS 7	DENSITY CLASS 8	DENSITY CLASS 9
1	0.0	0.0								
2	0.0	0.0								
3	0.0	0.0								
4	0.0	0.0								
5	0.0024045	0.0024045								
6	0.0025303	0.0001261								
7	0.0220665	0.0195878								
8	0.0693267	0.0483268								
9	0.0766286	0.0073437								
10	0.0802163	0.0038855								

ATTRITION ACCRUED AS A FUNCTION OF TIME AT INTERCEPT

TIME SEG.	CUM FOR CLASS 1	DENSITY CLASS 1	DENSITY CLASS 2	DENSITY CLASS 3	DENSITY CLASS 4	DENSITY CLASS 5	DENSITY CLASS 6	DENSITY CLASS 7	DENSITY CLASS 8	DENSITY CLASS 9
1	0.0	0.0								
2	0.0	0.0								
3	0.0	0.0								
4	0.0	0.0								
5	0.0	0.0								
6	0.0025023	0.0025023								
7	0.0191067	0.0166461								
8	0.0676140	0.0494522								
9	0.0766475	0.0090451								
10	0.0802164	0.0045121								
	TOTALS	0.0802243								

TOTAL PK FOR DENSITY CLASS 1 AS A FUNCTION OF ASPECT SECTOR AND IMPACT SPEED.

SECTOR	AZIMUTH REAR=00	ELEV. DOWN=00	0-152	152-305	305-457	457-610	610-762	762-914	914-1067	1067-1219	TOTAL PK
1	000-045	000-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	045-090	000-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	090-135	000-045	0.0	0.0	0.0	0.0	0.0001340	0.0	0.0	0.0	0.0001340

AFATL P-001 AAASIM * AIRCRAFT COMBAT SURVIVABILITY SCENARIO * PAGE 11

TOTAL PK FOR DENSITY CLASS 1 AS A FUNCTION OF ASPECT SECTOR AND IMPACT SPEED.

SECTOR	AZIMUTH REAR=00	ELEV. DOWN=00	0-152	152-305	305-457	457-610	610-762	762-914	914-1067	1067-1219	TOTAL PK
4	135-180	000-045	0.0	0.0	0.0	0.0	0.0002519	0.0	0.0	0.0	0.0002519
5	180-225	000-045	0.0	0.0003255	0.0012023	0.0	0.0	0.0	0.0	0.0	0.0015274
6	225-270	000-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	270-315	000-045	0.0	0.0000411	0.0	0.0	0.0	0.0	0.0	0.0	0.0000411
8	315-360	000-045	0.0001108	0.0001518	0.0	0.0	0.0	0.0	0.0	0.0	0.0002626
9	000-045	045-090	0.0	0.0000374	0.0	0.0	0.0	0.0	0.0	0.0	0.0000374
10	045-090	045-090	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	090-135	045-090	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	135-180	045-090	0.0	0.0	0.0	0.0	0.0007085	0.0	0.0	0.0	0.0007085
13	180-225	045-090	0.0	0.0	0.0058241	0.0025407	0.0167664	0.0020211	0.0	0.0	0.0271523
14	225-270	045-090	0.0	0.0036015	0.0002850	0.0	0.0000393	0.0	0.0	0.0	0.0039247
15	270-315	045-090	0.0	0.0	0.0000294	0.0	0.0	0.0	0.0	0.0	0.0000294
16	315-360	045-090	0.0	0.0006235	0.0002650	0.0	0.0	0.0	0.0	0.0	0.0008885
17	000-045	090-135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18	045-090	090-135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19	090-135	090-135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20	135-180	090-135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21	180-225	090-135	0.0	0.0	0.0	0.0	0.0	0.0392846	0.0	0.0	0.0392846
22	225-270	090-135	0.0	0.0	0.0	0.0	0.0001868	0.0017850	0.0	0.0	0.0019718
23	270-315	090-135	0.0	0.0	0.0	0.0054171	0.0	0.0	0.0	0.0	0.0054171
24	315-360	090-135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25	000-045	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26	045-090	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27	090-135	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
28	135-180	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29	180-225	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30	225-270	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
31	270-315	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
32	315-360	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		TOTALS	0.0001108	0.0047761	0.0075947	0.0079440	0.0180647	0.0438568	0.0	0.0	0.0803164

***** END OF JOB - - P001 SCENARIO RUN COMPLETE *****

APPENDIX G

P001 ANALYSIS EXTENDED OUTPUT

MASK ANGLE FOR THIS RUN = 0.0 DEG.

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TIME	XXX	YYY	ZZZ	SPEED	XDOT	YDOT	ZDOT	HEADING	CLIMB	ROLL
0.0	0.0	500.0	457.0	231.99	231.30	-16.90	-5.70	-4.20	-1.40	0.0
1.38	317.9	476.8	449.2	232.06	231.39	-16.90	-3.96	-4.20	-0.96	4.96
2.75	635.5	453.7	441.4	232.14	231.48	-16.90	-2.21	-4.20	-0.53	9.91
4.13	953.8	430.5	433.6	232.22	231.58	-16.90	-0.47	-4.20	-0.09	14.87
5.51	1271.8	407.3	425.8	232.30	231.67	-16.90	1.27	-4.20	0.34	19.82
6.88	1592.2	404.6	424.7	232.29	231.72	-13.37	0.03	-3.32	0.03	11.62
8.26	1914.0	413.4	427.3	232.24	231.74	-7.87	-2.89	-1.54	-0.71	-3.94
9.63	2235.6	422.2	429.4	232.20	231.76	-2.36	-5.81	-0.57	-1.44	-19.51
11.01	2557.6	431.0	432.5	232.15	231.79	3.14	-8.73	0.81	-2.18	-35.08
12.39	2874.9	407.5	427.9	232.18	231.35	0.73	-8.54	0.21	-2.13	-33.99
13.76	3186.3	340.8	413.7	232.31	230.31	-12.32	-4.17	-3.04	-1.04	-10.54
15.14	3497.6	274.2	399.4	232.45	229.27	-25.38	0.20	-6.29	0.05	12.90
16.52	3809.0	207.5	385.2	232.59	228.22	-38.43	4.56	-9.54	1.14	36.35
17.89	4121.2	164.1	376.3	232.66	227.53	-44.73	7.73	-11.12	1.93	51.39
19.27	4436.6	206.8	387.3	232.53	228.14	-26.12	6.47	-6.50	1.60	35.39
20.65	4752.0	249.5	398.3	232.39	228.74	-7.50	5.21	-1.88	1.28	19.38
22.02	5067.4	292.2	409.2	232.25	229.35	11.11	3.95	2.74	0.95	3.38
23.40	5382.8	334.9	420.2	232.12	229.56	29.73	2.69	7.26	0.62	-12.62
24.78	5704.1	360.0	424.3	232.07	230.24	28.00	-0.06	6.53	-0.04	-17.19
26.15	6025.9	383.7	427.9	232.02	230.50	24.65	-2.93	6.10	-0.73	-20.84
27.53	6347.7	407.4	431.4	231.98	230.76	21.31	-5.80	5.27	-1.41	-24.49
28.90	6669.5	431.2	435.0	231.93	231.02	17.96	-8.67	4.44	-2.10	-28.15
30.28	6989.2	423.2	426.7	232.02	231.25	11.66	-7.04	2.89	-1.70	-17.10
31.66	7308.1	402.4	413.6	232.17	231.46	4.19	-3.59	1.04	-0.86	-0.11
33.03	7627.1	381.7	400.6	232.32	231.67	-3.31	-0.13	-0.80	-0.02	16.87
34.41	7946.0	360.9	387.5	232.47	231.88	-10.80	3.32	-2.64	0.82	33.85
35.79	8261.6	372.1	383.1	232.51	231.67	-9.82	5.38	-2.39	1.32	43.43
37.16	8572.7	426.2	390.3	232.41	230.91	2.57	5.56	0.68	1.36	43.02
38.54	8883.9	480.4	397.5	232.31	230.14	14.95	5.74	3.74	1.41	42.61
39.92	9195.0	534.5	404.7	232.22	229.37	27.34	5.92	6.81	1.45	42.21
41.29	9506.2	588.7	412.0	232.12	228.60	39.73	6.10	9.88	1.50	41.80
42.67	9800.0	712.6	420.3	232.03	225.07	51.51	5.01	12.52	1.22	45.26
44.04	10093.7	837.0	428.7	231.93	221.53	63.29	3.91	15.55	0.94	48.73
45.42	10387.4	961.3	437.1	231.84	217.98	75.07	2.82	18.58	0.66	52.21
46.80	10681.1	1085.6	445.5	231.75	214.44	86.86	1.72	22.01	0.38	55.68
48.17	10926.9	1280.2	449.4	231.73	185.04	85.78	42.27	27.15	13.04	44.74
49.55	11152.9	1503.7	451.3	231.73	144.96	79.39	100.02	33.15	31.04	27.84
50.93	11378.9	1727.2	453.2	231.74	104.88	73.01	157.78	39.15	49.05	10.94
52.30	11594.7	1940.4	475.4	231.25	68.82	68.04	208.81	44.68	64.94	-4.66
53.68	11683.8	2025.2	747.8	224.64	82.45	80.54	176.94	44.47	54.87	-4.10
55.06	11772.8	2110.1	1020.2	218.04	96.08	93.04	145.08	44.26	44.80	-3.55
56.43	11861.9	2195.0	1292.7	211.43	109.71	105.54	113.21	44.05	34.72	-3.00
57.81	11951.0	2279.9	1565.1	204.83	123.34	118.05	81.34	43.84	24.65	-2.44
59.19	12040.1	2364.8	1837.5	198.22	136.97	130.55	49.47	43.63	14.57	-1.89
60.56	12217.9	2530.7	1931.9	198.00	140.76	133.45	34.96	43.48	10.22	8.03
61.94	12412.0	2711.6	1993.3	198.96	142.73	134.58	23.65	43.33	6.93	19.68
63.31	12606.2	2892.5	2054.7	199.92	144.69	135.72	12.35	43.18	3.63	31.33
64.69	12800.4	3073.4	2116.2	200.87	146.66	136.85	1.04	43.03	0.34	42.98
66.07	12958.2	3301.1	2128.3	202.24	139.83	142.50	-11.55	45.60	-3.22	42.57
67.44	13105.5	3542.4	2126.2	203.73	130.45	149.47	-24.52	48.96	-6.85	38.65
68.82	13252.9	3783.7	2124.0	205.21	121.08	156.44	-37.49	52.31	-10.49	34.74
70.20	13400.2	4025.0	2121.9	206.70	111.70	163.41	-50.46	55.67	-14.12	30.82
71.57	13542.4	4268.3	2109.1	208.25	102.72	169.68	-62.90	58.83	-17.59	28.01
72.95	13649.5	4525.5	2022.4	210.27	96.54	171.12	-71.67	60.63	-19.94	32.88

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TIME	XXX	YYY	ZZZ	SPEED	XDOT	YDOT	ZDOT	HEADING	CLIMB	ROLL
74.33	13756.5	4782.7	1935.7	212.30	90.36	172.56	-80.45	62.44	-22.28	37.75
75.70	13863.5	5039.9	1849.0	214.32	84.17	173.99	-89.22	64.25	-24.62	42.62
77.08	13970.6	5297.1	1762.3	216.35	77.59	175.43	-97.95	66.06	-26.96	47.49
78.45	14052.3	5557.7	1659.9	218.46	70.19	178.81	-101.98	68.41	-27.95	45.20
79.83	14061.1	5828.1	1512.1	220.81	57.72	187.79	-92.19	72.31	-25.02	22.29
81.21	14070.0	6098.4	1364.3	223.15	45.26	196.76	-82.41	76.21	-22.10	-0.62
82.58	14078.5	6368.8	1216.4	225.50	32.80	205.74	-72.62	80.11	-19.18	-23.53
83.96	14087.7	6639.2	1068.6	227.85	20.34	214.71	-62.84	84.02	-16.26	-46.44
85.34	14096.6	6909.6	920.8	230.20	7.87	223.69	-53.05	87.92	-13.33	-69.35
86.71	14330.2	7106.7	844.3	231.10	47.13	206.21	-42.21	76.85	-10.57	-62.57
88.09	14574.6	7300.4	771.2	231.92	88.87	187.47	-31.32	65.05	-7.82	-54.36
89.47	14819.1	7494.0	698.1	232.75	130.61	168.72	-20.42	53.26	-5.07	-46.14
90.84	15063.5	7687.7	625.0	233.58	172.35	149.97	-9.53	41.46	-2.32	-37.93
92.22	15335.7	7850.4	599.2	233.81	186.66	139.79	-7.75	36.64	-1.86	-24.07
93.60	15617.6	8002.2	590.0	233.83	191.33	132.62	-9.17	34.73	-2.22	-8.22
94.97	15899.6	8154.0	580.9	233.85	196.00	125.44	-10.59	32.63	-2.57	7.63
96.35	16181.6	8305.8	571.7	233.88	200.67	118.27	-12.00	30.52	-2.93	23.48
97.72	16463.5	8457.7	562.5	233.90	205.34	111.09	-13.42	28.42	-3.28	39.33
99.10	16707.1	8668.9	544.4	233.98	199.50	119.71	-11.36	30.98	-2.78	45.72
100.48	16948.5	8883.6	525.8	234.08	193.04	129.23	-9.05	33.82	-2.23	51.57
101.85	17189.5	9098.4	507.1	234.17	186.58	138.76	-6.83	36.66	-1.68	57.41
103.23	17431.3	9313.1	488.5	234.26	180.12	148.29	-4.56	39.49	-1.13	63.26
104.61	17631.3	9550.3	473.2	234.32	168.76	159.23	-2.65	43.51	-0.66	66.21
105.98	17666.8	9866.3	469.3	234.25	140.25	175.06	-2.00	51.62	-0.49	59.08
107.36	17742.3	10182.2	465.5	234.19	111.75	190.90	-1.34	59.73	-0.32	51.94
108.74	17797.8	10498.1	461.7	234.13	83.25	206.74	-0.68	67.84	-0.15	44.80
110.11	17853.3	10814.1	457.5	234.06	54.75	222.58	-0.03	75.95	0.02	37.67
111.49	17879.4	11134.7	456.2	233.98	40.48	230.45	0.25	80.00	0.08	28.08
112.86	17876.2	11460.1	456.5	233.87	40.45	230.34	0.14	80.00	0.05	16.05
114.24	17873.1	11785.5	456.9	233.76	40.41	230.24	0.04	80.00	0.01	4.01

XR= 0.0 YR= 0.0 XT= 0.0 YT= 0.0 PSI= 0.0 DZ= 0.0

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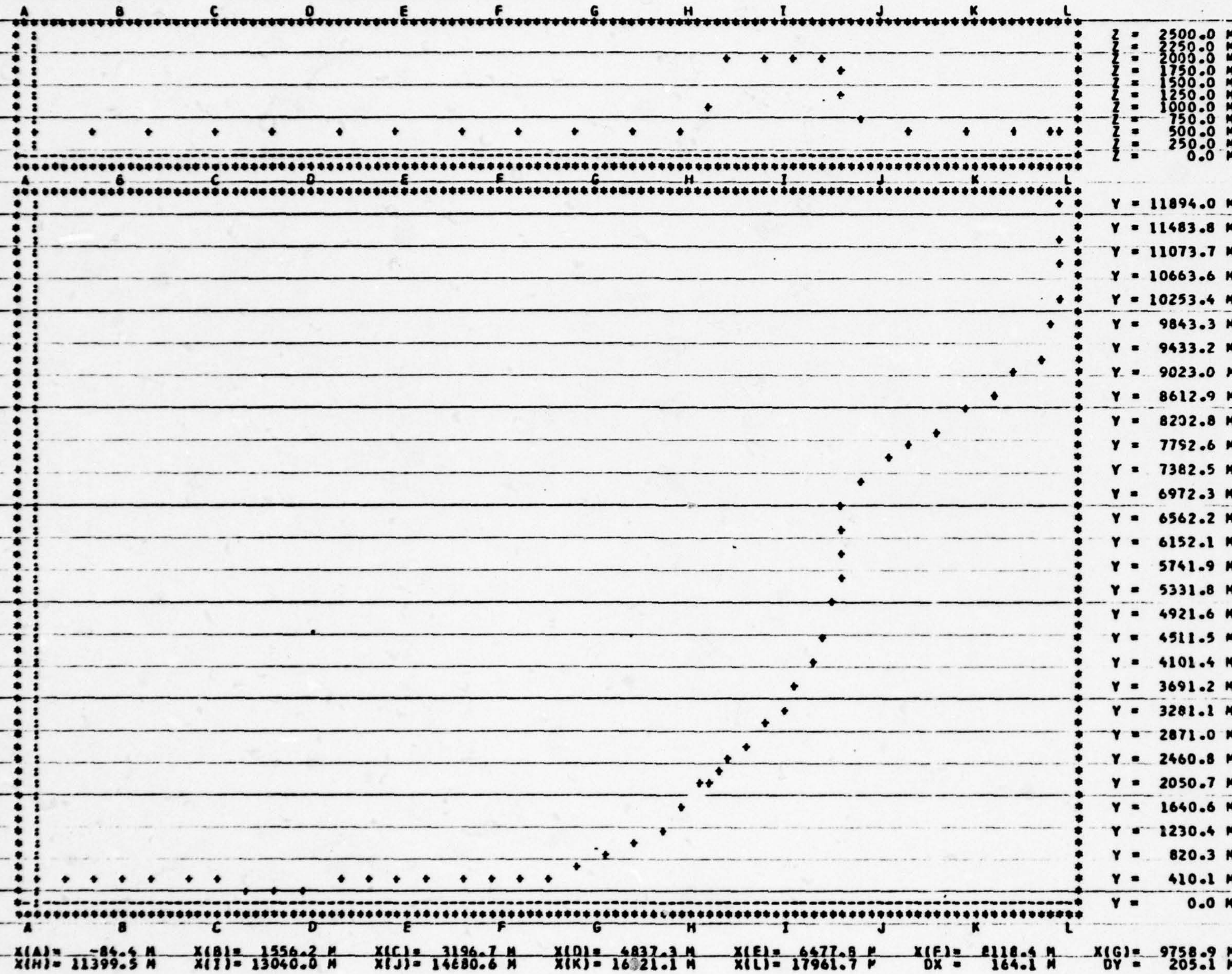
AFATL P-001 AAASIN * AIRCRAFT COMBAT SURVIVABILITY SCENARIO PAGE 3



10 TIME INTERVALS FOR PK ACCUMULATION

0.00 11.47 22.95 34.42 45.89 57.37 68.84 80.31 91.78 103.26 999.99

VULNERABLE AREA (SQ. METERS) AS A FUNCTION OF IMPACT SPEED (METERS/SEC) AND ASPECT VIEW
VULNERABLE AREA TABLE VS TYPE 1 AND 2 WEAPONS

VIEW	0	152	305	457	610	762	914	1067	1219
1	0.00	0.46	0.46	7.11	7.11	7.11	7.11	7.11	7.11
2	0.00	0.66	0.66	5.55	5.55	5.55	5.55	5.55	5.55
3	0.00	0.70	0.70	5.57	5.57	5.57	5.57	5.57	5.57
4	0.00	0.66	0.66	7.36	7.36	7.36	7.36	7.36	7.36
5	0.00	0.70	0.70	5.57	5.57	5.57	5.57	5.57	5.57
6	0.00	0.66	0.66	5.55	5.55	5.55	5.55	5.55	5.55
7	0.00	0.70	0.70	5.57	5.57	5.57	5.57	5.57	5.57
8	0.00	0.66	0.66	7.36	7.36	7.36	7.36	7.36	7.36
9	0.00	0.70	0.70	5.57	5.57	5.57	5.57	5.57	5.57
10	0.00	0.46	0.46	0.74	0.74	0.74	0.74	0.74	0.74
11	0.00	0.66	0.66	2.86	2.86	2.86	2.86	2.86	2.86
12	0.00	0.46	0.46	3.30	3.30	3.30	3.30	3.30	3.30
13	0.00	0.66	0.66	2.86	2.86	2.86	2.86	2.86	2.86
14	0.00	0.46	0.46	0.74	0.74	0.74	0.74	0.74	0.74
15	0.00	0.66	0.66	2.86	2.86	2.86	2.86	2.86	2.86
16	0.00	0.46	0.46	3.30	3.30	3.30	3.30	3.30	3.30
17	0.00	0.66	0.66	2.66	2.86	2.86	2.86	2.86	2.86
18	0.00	0.66	0.66	5.55	5.55	5.55	5.55	5.55	5.55
19	0.00	0.70	0.70	5.57	5.57	5.57	5.57	5.57	5.57
20	0.00	0.66	0.66	7.36	7.36	7.36	7.36	7.36	7.36
21	0.00	0.70	0.70	5.57	5.57	5.57	5.57	5.57	5.57
22	0.00	0.66	0.66	5.55	5.55	5.55	5.55	5.55	5.55
23	0.00	0.70	0.70	5.57	5.57	5.57	5.57	5.57	5.57
24	0.00	0.66	0.66	7.36	7.36	7.36	7.36	7.36	7.36
25	0.00	0.70	0.70	5.57	5.57	5.57	5.57	5.57	5.57
26	0.00	0.46	0.46	7.11	7.11	7.11	7.11	7.11	7.11

G T	TIME/ ROUND	MIN ELEV	MAX ELEV	AZIM RATE	ELEV RATE	MAX TOF1	MAX TOF2	MUZZ VEL	BALLISTIC CONSTANT 1	BALLISTIC CONSTANT 2	VEL MIN	VEL MAX	RANGE MIN	RANGE MAX	SMOOTH CONST	MAX.AZ ERROR	MAX.EL ERROR
1	0.750	-10.00	85.00	30.00	25.00	1.60	99.99	840.	0.1802090	0.0123920	0.0	300.0	0.	3000.	9999.99	5.730	5.730
2	0.400	-8.50	90.00	30.00	25.00	2.20	99.99	1000.	0.2514990	-0.0062590	0.0	300.0	400.	3000.	9999.99	5.730	5.730
3	0.230	-10.00	85.00	80.00	45.00	3.80	7.50	930.	0.2299800	-0.0068890	0.0	350.0	500.	3300.	1.33	5.730	5.730
4	0.750	-5.00	85.00	30.00	20.00	4.10	99.99	880.	0.0893210	0.0042620	0.0	250.0	0.	5000.	9999.99	5.730	5.730
5	0.857	-4.00	87.00	30.00	18.00	6.20	11.60	960.	0.0784500	-0.0004210	0.0	300.0	0.	5500.	1.33	5.730	5.730
6	4.000	-3.00	82.00	30.00	20.00	99.99	19.20	800.	0.0506940	-0.0003570	999.9	999.9	99999.	99999.	1.33	5.730	5.730

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LOCATION 1 GUN TYPE 1 ERROR MODE 1 POSITION=(14800.0, 9000.0, 40.0) RADIUS= 0.0 M

L N DEM	FIRE TIME	FLT. TIME	INTCP TIME	FIRE RANGE	INTCP RANGE	SIG1	SIG2	BIAS1	BIAS2	CLOSE VEL.	AZIM. RATE	ELEV. RATE	MEAN AZ.ERR	MEAN EL.ERR	VULN AREA	SHOT PK	CUM.PK

PK AS A FUNCTION OF ASPECT SECTOR AND IMPACT SPEED. LOC 1 GT 1 EM 1 X 14800. Y 9000. Z 40. RADIUS 0.M

SECTOR	AZIMUTH REAR=00	ELEV. DOWN=00	0-152	152-305	305-457	457-610	610-762	762-914	914-1067	1067-1219	TOTAL PK
1	000-045	000-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	045-090	000-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	090-135	000-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	135-180	000-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	180-225	000-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	225-270	000-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	270-315	000-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	315-360	000-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	000-045	045-090	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	045-090	045-090	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	090-135	045-090	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	135-180	045-090	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	180-225	045-090	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	225-270	045-090	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15	270-315	045-090	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16	315-360	045-090	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17	000-045	090-135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18	045-090	090-135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19	090-135	090-135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20	135-180	090-135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21	180-225	090-135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22	225-270	090-135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23	270-315	090-135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24	315-360	090-135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25	000-045	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26	045-090	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27	090-135	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
28	135-180	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29	180-225	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30	225-270	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
31	270-315	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
32	315-360	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		TOTALS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

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LOCATION 2 GUN TYPE 1 ERROR MODE 1 POSITION=(16200.0, 8200.0, 40.0) RADIUS= 0.0 M

L N	QEM	FIRE TIME	FLT. TIME	INTCP TIME	FIRE RANGE	INTCP RANGE	SIG1	SIG2	BIAS1	BIAS2	CLOSE VEL.	AZIM. RATE	ELEV. RATE	MEAN AZ.ERR	MEAN EL.ERR	VULN AREA	SHOT PK	CUM.PK
1	1	91.00	1.59	92.59	1342.	1013.	64.6	48.8	104.7	31.8	666.0	-2.49	2.07	0.09	-0.17	3.63	0.00004	0.00004
1	1	91.77	1.37	93.14	1179.	907.	55.2	45.5	89.7	19.7	698.4	-0.45	5.86	0.55	0.15	3.92	0.00006	0.00010
1	1	92.54	1.18	93.72	1023.	804.	49.0	42.7	69.2	16.1	725.4	-1.97	6.77	0.60	0.24	4.31	0.00011	0.00021
1	1	93.31	1.01	94.31	877.	708.	46.8	40.1	53.4	11.7	744.2	-3.38	8.88	0.74	0.35	4.78	0.00020	0.00041
1	1	94.01	0.87	94.89	755.	630.	32.1	38.4	42.9	5.6	748.9	-6.20	11.87	1.08	0.47	5.26	0.00029	0.00071
1	1	94.78	0.77	95.55	643.	567.	82.7	37.6	37.6	9.5	730.2	-16.29	16.35	2.07	0.50	5.63	0.00025	0.00096
1	1	95.55	0.73	96.28	568.	542.	115.7	30.9	13.0	37.5	675.6	-30.00	21.15	2.58	-0.38	6.32	0.00013	0.00109

PK AS A FUNCTION OF ASPECT SECTOR AND IMPACT SPEED. LOC 2 GT 1 EM 1 X 16200. Y 8200. Z 40. RADIUS 0.M

SECTOR	AZIMUTH REAR=00	ELEV. DOWN=00	0-152	152-305	305-457	457-610	610-762	762-914	914-1067	1067-1219	TOTAL PK
1	000-045	000-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	045-090	000-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	090-135	000-045	0.0	0.0	0.0	0.0	0.0001340	0.0	0.0	0.0	0.0001340
4	135-180	000-045	0.0	0.0	0.0	0.0	0.0002519	0.0	0.0	0.0	0.0002519
5	180-225	000-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	225-270	000-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	270-315	000-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	315-360	000-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	000-045	045-090	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	045-090	045-090	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	090-135	045-090	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	135-180	045-090	0.0	0.0	0.0	0.0	0.0007089	0.0	0.0	0.0	0.0007089
13	180-225	045-090	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	225-270	045-090	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15	270-315	045-090	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16	315-360	045-090	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17	000-045	090-135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18	045-090	090-135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19	090-135	090-135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20	135-180	090-135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21	180-225	090-135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22	225-270	090-135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23	270-315	090-135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24	315-360	090-135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25	000-045	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26	045-090	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27	090-135	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
28	135-180	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29	180-225	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30	225-270	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
31	270-315	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
32	315-360	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		TOTALS	0.0	0.0	0.0	0.0	0.0010945	0.0	0.0	0.0	0.0010945

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LOCATION 3 GUN TYPE 2 ERROR MODE 1 POSITION=(13600.0, 7200.0, 20.0) RADIUS= 0.0 M

L	N.OEM	FIRE TIME	FLT. TIME	INTCP TIME	FIRE RANGE	INTCP RANGE	SIG1	SIG2	BIAS1	BIAS2	CLOSE VEL.	AZIM. RATE	ELEV. RATE	MEAN AZ.ERR	MEAN EL.ERR	VULN AREA	SHOT PK	CUM.PK
1	1	80.96	2.17	83.13	1651.	1432.	137.4	57.4	178.7	17.0	606.0	3.77	1.92	-0.52	0.02	3.22	0.00003	0.00003
1	1	81.34	2.06	83.40	1774.	1383.	132.3	56.7	167.1	8.4	616.3	4.24	2.04	-0.54	0.00	3.17	0.00003	0.00006
1	1	81.72	1.96	83.68	1695.	1333.	127.4	55.9	155.9	1.5	625.9	4.79	2.16	-0.58	-0.02	3.11	0.00003	0.00009
1	1	82.11	1.86	83.96	1624.	1285.	123.1	54.9	146.5	4.0	635.6	5.44	2.28	-0.62	-0.04	3.05	0.00004	0.00012
1	1	82.55	1.74	84.30	1539.	1228.	118.4	53.6	136.5	8.5	645.9	6.37	2.42	-0.68	-0.08	2.96	0.00004	0.00016
1	1	82.94	1.65	84.59	1467.	1181.	114.7	52.3	129.4	10.5	654.2	7.33	2.53	-0.75	-0.11	2.86	0.00004	0.00020
1	1	83.32	1.56	84.89	1397.	1135.	111.3	50.8	123.5	12.0	661.6	8.49	2.61	-0.84	-0.15	3.08	0.00005	0.00025
1	1	83.71	1.48	85.19	1325.	1050.	107.4	49.1	118.4	11.5	667.7	9.86	2.64	-0.95	-0.20	3.34	0.00005	0.00030
1	1	84.15	1.43	85.58	1252.	1061.	101.5	47.5	108.8	32.2	662.0	11.77	2.60	-1.11	-0.27	3.54	0.00005	0.00035
1	1	84.54	1.44	85.98	1189.	1070.	98.8	47.1	104.1	81.6	639.2	13.65	2.45	-1.27	-0.35	3.51	0.00002	0.00037
1	1	84.92	1.47	86.40	1129.	1087.	96.2	46.8	115.4	138.2	612.4	15.70	2.13	-1.44	-0.45	3.41	0.00000	0.00037
1	1	85.31	1.53	86.83	1073.	1113.	93.8	46.6	143.5	202.6	580.7	17.75	1.57	-1.61	-0.56	3.24	0.0	0.00037
1	1	85.75	1.61	87.36	1064.	1157.	85.2	44.4	152.9	279.4	543.8	13.57	-5.13	-0.57	-2.72	3.30	0.0	0.00037
1	1	86.14	1.70	87.84	1075.	1205.	77.3	44.7	132.0	255.6	505.0	16.50	-9.78	-0.25	-1.25	3.34	0.0	0.00037
1	1	86.52	1.82	88.34	1093.	1266.	75.3	49.5	141.9	263.2	460.7	13.78	-7.30	-0.32	-1.58	3.65	0.0	0.00037
1	1	86.91	1.97	88.87	1119.	1337.	75.4	54.2	145.2	257.4	412.2	11.52	-9.52	-0.27	-1.03	2.90	0.0	0.00037
1	1	87.35	2.18	89.54	1156.	1437.	78.2	61.3	152.7	256.1	352.8	9.62	-8.20	-0.24	-0.90	1.70	0.0	0.00037

PK AS A FUNCTION OF ASPECT SECTOR AND IMPACT SPEED. LOC 3 GT 2 EM 1 X 13600. Y 7200. Z 20. RADIUS 0.M

SECTOR	AZIMUTH REAR=00	ELEV. DOWN=00	0-152	152-305	305-457	457-610	610-762	762-914	914-1067	1067-1219	TOTAL PK
1	000-045	000-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	045-090	000-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	090-135	000-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	135-180	000-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	180-225	000-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	225-270	000-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	270-315	000-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	315-360	000-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	000-045	045-090	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	045-090	045-090	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	090-135	045-090	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	135-180	045-090	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	180-225	045-090	0.0	0.0	0.0	0.0000267	0.0001358	0.0	0.0	0.0	0.0001625
14	225-270	045-090	0.0	0.0	0.0	0.0	0.0000393	0.0	0.0	0.0	0.0000393
15	270-315	045-090	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16	315-360	045-090	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17	000-045	090-135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18	045-090	090-135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19	090-135	090-135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20	135-180	090-135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21	180-225	090-135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22	225-270	090-135	0.0	0.0	0.0	0.0	0.0001672	0.0	0.0	0.0	0.0001672
23	270-315	090-135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24	315-360	090-135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25	000-045	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26	045-090	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27	090-135	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
28	135-180	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

PK AS A FUNCTION OF ASPECT SECTOR AND IMPACT SPEED. LOC 3 GT 2 EM 1 X 13600. Y 7200. Z 20. RADIUS 0.M

SECTOR	AZIMUTH REAR=00	ELEV. DOWN=CO	0-152	152-305	305-457	457-610	610-762	762-914	914-1067	1067-1219	TOTAL PK
29	180-225	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30	225-270	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	C.0	0.0
31	270-315	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
32	315-360	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		TOTALS	0.0	0.0	0.0	0.0000267	0.0003423	0.0	0.0	0.0	0.0003690

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LOCATION 4 GUN TYPE 2 ERROR MODE 1 POSITION=(13400.0, 8000.0, 20.0) RADIUS= 0.0 M

L N DEM	FIRE TIME	FLT. TIME	INTCP TIME	FIRE RANGE	INTCP RANGE	SIG1	SIG2	BIAS1	BIAS2	CLOSE VEL.	AZTM. RATE	ELEV. RATE	MEAN AZ.ERR	MEAN EL.ERR	VULN AREA	SHOT PK	CUM.PK

PK AS A FUNCTION OF ASPECT SECTOR AND IMPACT SPEED. LOC 4 GT 2 EN 1 X 13400. Y 8000. Z 20. RADIUS 0.M

SECTOR	AZIMUTH REAR=00	ELEV. DOWN=00	0-152	152-305	305-457	457-610	610-762	762-914	914-1067	1067-1219	TOTAL PK
1	000-045	000-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	045-090	000-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	090-135	000-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	135-180	000-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	180-225	000-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	225-270	000-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	270-315	000-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	315-360	000-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	000-045	045-090	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	045-090	045-090	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	090-135	045-090	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	135-180	045-090	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	180-225	045-090	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	225-270	045-090	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15	270-315	045-090	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16	315-360	045-090	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17	000-045	090-135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18	045-090	090-135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19	090-135	090-135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20	135-180	090-135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21	180-225	090-135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22	225-270	090-135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23	270-315	090-135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24	315-360	090-135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25	000-045	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26	045-090	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27	090-135	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
28	135-180	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29	180-225	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30	225-270	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
31	270-315	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
32	315-360	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		TOTALS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

```
ECM INPUTS (INITIAL OR CHANGED)

IP =            5
IJ =            0
GAINJ(DB) =   1.00
PJW(W) =      500.00
PLEN(S) =   0.0
IX =            1
XSEC(SQM) =     0.0
CALX =         1.000
IRECM =         1
SJTMAX(DB) =   3.00


JAMMER ANTENNA GAIN  1.000 DB

AIRCRAFT CROSS SECTION TABLE SPECIFIED.  PRINTED VALUES WILL BE MULTIPLIED BY CALX. CALX=      1.00
```

```
TABLE DATA
  19 ELEMENTS FROM      0.0  TO     180.00 BY      10.00  AZ
   7 ELEMENTS FROM    -90.00 TO      90.00 BY      30.00  EL
ELSEWHERE TABLE IS    1000.00
```

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BCS MATRIX

ELEV	0	10	20	30	40	50	60	70	80	90	100	110	120
-120.0	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00
-90.0	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00
-60.0	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
-30.0	0.27	0.18	0.05	0.02	0.16	0.17	0.06	0.17	0.23	0.05	0.02	0.01	0.01
0.0	0.00	0.00	0.01	0.01	0.09	0.09	0.04	0.07	0.11	0.03	0.02	0.01	0.01
30.0	0.27	0.18	0.05	0.02	0.16	0.17	0.06	0.17	0.23	0.05	0.02	0.01	0.01
60.0	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
90.0	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00
120.0	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00

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RCS MATRIX

ELEV	130	140	150	160	170	180
-120.0	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00
-90.0	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00
-60.0	100.00	100.00	100.00	100.00	100.00	100.00
-30.0	0.07	0.07	0.02	0.03	0.11	0.45
0.0	0.03	0.03	0.02	0.03	0.10	0.51
30.0	0.07	0.07	0.02	0.03	0.11	0.45
60.0	100.00	100.00	100.00	100.00	100.00	100.00
90.0	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00
120.0	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00

VULNERABLE AREA (SQ. METERS) AS A FUNCTION OF IMPACT SPEED (METERS/SEC) AND ASPECT VIEW
VULNERABLE AREA TABLE VS TYPE 3 WEAPONS

VIEW	0	152	305	457	610	762	914	1067	1219
1	0.00	12.54	12.54	13.47	13.47	13.47	13.47	13.47	13.47
2	0.00	9.65	9.85	10.51	10.51	10.51	10.51	10.51	10.51
3	0.00	9.64	9.64	11.15	11.15	11.15	11.15	11.15	11.15
4	0.00	12.64	12.64	14.78	14.78	14.78	14.78	14.78	14.78
5	0.00	9.64	9.64	11.15	11.15	11.15	11.15	11.15	11.15
6	0.00	9.85	9.85	10.51	10.51	10.51	10.51	10.51	10.51
7	0.00	9.64	9.64	11.15	11.15	11.15	11.15	11.15	11.15
8	0.00	12.64	12.64	14.78	14.78	14.78	14.78	14.78	14.78
9	0.00	9.64	9.64	11.15	11.15	11.15	11.15	11.15	11.15
10	0.00	1.39	1.39	1.39	1.39	1.39	1.39	1.39	1.39
11	0.00	4.76	4.76	6.24	6.24	6.24	6.24	6.24	6.24
12	0.00	5.34	5.34	7.43	7.43	7.43	7.43	7.43	7.43
13	0.00	4.76	4.76	6.24	6.24	6.24	6.24	6.24	6.24
14	0.00	1.39	1.39	1.39	1.39	1.39	1.39	1.39	1.39
15	0.00	4.76	4.76	6.24	6.24	6.24	6.24	6.24	6.24
16	0.00	5.34	5.34	7.43	7.43	7.43	7.43	7.43	7.43
17	0.00	4.76	4.76	6.24	6.24	6.24	6.24	6.24	6.24
18	0.00	9.85	9.85	10.51	10.51	10.51	10.51	10.51	10.51
19	0.00	9.64	9.64	11.15	11.15	11.15	11.15	11.15	11.15
20	0.00	12.64	12.64	14.78	14.78	14.78	14.78	14.78	14.78
21	0.00	9.64	9.64	11.15	11.15	11.15	11.15	11.15	11.15
22	0.00	9.85	9.85	10.51	10.51	10.51	10.51	10.51	10.51
23	0.00	9.64	9.64	11.15	11.15	11.15	11.15	11.15	11.15
24	0.00	12.64	12.64	14.78	14.78	14.78	14.78	14.78	14.78
25	0.00	9.64	9.64	11.15	11.15	11.15	11.15	11.15	11.15
26	0.00	12.54	12.54	13.47	13.47	13.47	13.47	13.47	13.47

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LOCATION 5 GUN TYPE 3 ERROR MODE 4 POSITION=(11300.0, 9700.0, 50.0) RADIUS= 0.C M

L N DEM	FIRE TIME	FLT. TIME	INTCP TIME	FIRE RANGE	INTCP RANGE	SIG1	SIG2	BIAS1	BIAS2	CLOSE VEL.	AZIM. RATE	ELEV. RATE	MEAN AZ.ERR	MEAN EL.ERR	VULN AREA	SHOT PK	CUM.PK

PK AS A FUNCTION OF ASPECT SECTOR AND IMPACT SPEED. LOC 5 GT 3 EM 4 X 11300. Y 9700. Z 50. RADIUS 0.M

SECTOR	AZIMUTH REAR=00	ELEV. DOWN=00	0-152	152-305	305-457	457-610	610-762	762-914	914-1067	1067-1219	TOTAL PK
1	000-045	000-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	045-090	000-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	090-135	000-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	135-180	000-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	180-225	000-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	225-270	000-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	270-315	000-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	315-360	000-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	000-045	045-090	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	045-090	045-090	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	090-135	045-090	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	135-180	045-090	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	180-225	045-090	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	225-270	045-090	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15	270-315	045-090	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16	315-360	045-090	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17	000-045	090-135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18	045-090	090-135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19	090-135	090-135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20	135-180	090-135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21	180-225	090-135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22	225-270	090-135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23	270-315	090-135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24	315-360	090-135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25	000-045	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26	045-090	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27	090-135	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
28	135-180	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29	180-225	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30	225-270	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
31	270-315	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
32	315-360	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		TOTALS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

```
MULTIPATH INPUTS (INITIAL OR CHANGES

IRMP =          1
REFC =      0.350
```

LOCATION 6 GUN TYPE 3 ERROR MODE 3 POSITION=(15600.0, 10900.0, 90.0) RADIUS= 0.0 M

L N	GEM	FIRE TIME	FLT. TIME	INTCP TIME	FIRE RANGE	INTCP RANGE	SIG1	SIG2	BIAS1	BIAS2	CLOSE VEL.	AZIM. RATE	ELEV. RATE	MEAN AZ.ERR	MEAN EL.ERR	VULN AREA	SHOT PK	CUM.PK
1	1	85.75	7.49	93.24	4260.	2980.	239.4	116.0	1451.0	107.4	458.3	1.66	-0.31	0.50	0.06	2.95	0.0	0.0
1	1	85.82	7.46	93.28	4248.	2975.	234.9	112.1	1430.8	101.0	457.9	2.22	-0.08	0.47	0.05	3.00	0.0	0.0
1	1	85.88	7.44	93.32	4235.	2971.	230.5	108.4	1409.1	93.6	457.4	2.56	0.10	0.41	0.03	3.05	0.0	0.0
1	1	85.95	7.42	93.37	4222.	2966.	226.3	104.7	1386.9	85.7	457.0	2.66	0.17	0.34	0.01	3.10	0.0	0.0
1	1	85.95	7.42	93.37	4222.	2966.	226.3	104.7	1386.9	85.7	457.0	2.66	0.17	0.34	0.01	3.10	0.0	0.0
1	1	86.01	7.40	93.41	4209.	2961.	222.1	101.2	1365.8	78.3	456.5	2.53	0.15	0.25	-0.02	3.16	0.0	0.0
1	1	86.07	7.38	93.46	4197.	2956.	218.0	97.9	1345.7	71.5	456.0	2.26	0.06	0.25	-0.03	3.21	0.0	0.0
1	1	86.14	7.36	93.50	4184.	2951.	214.1	94.7	1326.6	65.7	455.6	1.92	-0.08	0.24	-0.04	3.26	0.0	0.0
1	1	86.14	7.36	93.50	4184.	2951.	214.1	94.7	1326.6	65.7	455.6	1.92	-0.08	0.24	-0.04	3.26	0.0	0.0
1	1	86.20	7.34	93.54	4171.	2947.	210.3	91.7	1308.7	60.8	455.2	1.62	-0.21	0.24	-0.04	3.31	0.0	0.0
1	1	86.27	7.32	93.59	4159.	2942.	206.6	88.9	1292.2	56.8	454.8	1.41	-0.32	0.26	-0.04	3.35	0.0	0.0
1	1	86.33	7.30	93.63	4146.	2937.	203.0	86.1	1276.1	53.3	454.3	1.32	-0.35	0.28	-0.03	3.40	0.0	0.0
1	1	86.39	7.28	93.67	4133.	2932.	199.6	83.6	1259.3	49.7	453.9	1.35	-0.40	0.31	-0.02	3.45	0.0	0.0
1	1	86.39	7.26	93.67	4133.	2932.	199.6	83.6	1259.3	49.7	453.9	1.35	-0.40	0.31	-0.02	3.45	0.0	0.0
1	1	86.46	7.26	93.72	4121.	2928.	196.3	81.2	1242.0	45.9	453.5	1.47	-0.37	0.32	-0.01	3.50	0.0	0.0
1	1	86.52	7.24	93.76	4108.	2923.	193.0	79.0	1224.5	41.9	453.0	1.65	-0.30	0.33	-0.00	3.55	0.0	0.0
1	1	86.59	7.22	93.81	4096.	2918.	189.5	76.9	1206.1	37.5	452.5	1.83	-0.23	0.32	-0.00	3.60	0.0	0.0
1	1	86.59	7.22	93.81	4096.	2918.	189.5	76.9	1206.1	37.5	452.5	1.83	-0.23	0.32	-0.00	3.60	0.0	0.0
1	1	86.65	7.20	93.85	4083.	2913.	186.9	74.9	1186.7	32.5	451.9	1.98	-0.17	0.31	-0.01	3.65	0.0	0.0
1	1	86.71	7.18	93.90	4070.	2909.	184.1	73.2	1167.4	27.6	451.4	2.07	-0.13	0.29	-0.01	3.71	0.0	0.0
1	1	86.78	7.16	93.94	4058.	2904.	181.3	71.5	1148.0	22.6	450.8	2.10	-0.12	0.27	-0.02	3.77	0.0	0.0
1	1	86.84	7.14	93.98	4045.	2900.	178.7	70.1	1128.1	17.5	450.2	2.07	-0.13	0.25	-0.03	3.82	0.0	0.0
1	1	86.84	7.14	93.98	4045.	2900.	178.7	70.1	1128.1	17.5	450.2	2.07	-0.13	0.25	-0.03	3.82	0.0	0.0
1	1	86.91	7.13	94.03	4033.	2895.	176.1	68.8	1109.7	13.1	449.6	2.01	-0.16	0.24	-0.03	3.88	0.0	0.0
1	1	86.97	7.10	94.08	4020.	2890.	173.8	67.6	1090.5	8.7	449.0	1.93	-0.20	0.23	-0.04	3.94	0.0	0.0
1	1	87.03	7.09	94.12	4008.	2886.	171.5	66.6	1072.1	4.7	448.4	1.86	-0.24	0.23	-0.04	3.99	0.0	0.0
1	1	87.03	7.09	94.12	4008.	2886.	171.5	66.6	1072.1	4.7	448.4	1.86	-0.24	0.23	-0.04	3.99	0.0	0.0
1	1	87.10	7.07	94.17	3995.	2881.	169.3	65.7	1054.0	1.0	447.8	1.82	-0.27	0.23	-0.04	4.05	0.0	0.0
1	1	87.16	7.05	94.21	3983.	2877.	167.4	65.6	1035.3	2.7	447.2	1.81	-0.28	0.23	-0.04	4.11	0.0	0.0
1	1	87.23	7.03	94.26	3970.	2872.	165.4	65.7	1017.8	5.9	446.5	1.83	-0.29	0.23	-0.03	4.17	0.0	0.0
1	1	87.29	7.01	94.30	3958.	2868.	164.7	66.0	999.0	9.6	445.9	1.87	-0.28	0.23	-0.03	4.22	0.0	0.0
1	1	87.29	7.01	94.30	3958.	2868.	164.7	66.0	999.0	9.6	445.9	1.87	-0.28	0.23	-0.03	4.22	0.0	0.0
1	1	87.35	6.99	94.35	3946.	2863.	164.2	66.3	981.1	12.8	445.1	1.93	-0.26	0.23	-0.03	4.28	0.0	0.0
1	1	87.42	6.97	94.39	3933.	2859.	164.0	66.8	961.9	16.4	444.5	1.99	-0.24	0.22	-0.03	4.34	0.0	0.0
1	1	87.48	6.96	94.44	3921.	2854.	163.8	67.3	943.7	19.7	443.7	2.03	-0.23	0.21	-0.04	4.40	0.0	0.0
1	1	87.48	6.96	94.44	3921.	2854.	163.8	67.3	943.7	19.7	443.7	2.03	-0.23	0.21	-0.04	4.40	0.0	0.0
1	1	87.55	6.94	94.48	3908.	2850.	163.8	67.9	924.2	23.2	443.0	2.06	-0.22	0.20	-0.04	4.46	0.0	0.0
1	1	87.61	6.92	94.53	3896.	2845.	163.8	68.5	905.9	26.4	442.2	2.08	-0.22	0.19	-0.04	4.52	0.0	0.0
1	1	87.67	6.90	94.57	3884.	2842.	164.1	69.2	886.5	29.7	441.5	2.08	-0.23	0.18	-0.05	4.58	0.0	0.0
1	1	87.74	6.88	94.62	3871.	2837.	164.4	70.0	868.4	32.5	440.7	2.07	-0.24	0.18	-0.05	4.64	0.0	0.0
1	1	87.74	6.88	94.62	3871.	2837.	164.4	70.0	868.4	32.5	440.7	2.07	-0.24	0.18	-0.05	4.64	0.0	0.0
1	1	87.80	6.87	94.67	3859.	2833.	164.5	70.8	849.8	35.3	439.9	2.06	-0.25	0.17	-0.05	4.70	0.0	0.0
1	1	87.87	6.85	94.71	3847.	2829.	165.5	71.6	831.2	38.0	439.1	2.06	-0.26	0.16	-0.05	4.76	0.0	0.0
1	1	87.93	6.83	94.76	3835.	2824.	166.2	72.4	813.5	40.3	438.3	2.05	-0.27	0.16	-0.05	4.83	0.0	0.0
1	1	87.99	6.81	94.81	3822.	2820.	167.1	73.3	794.4	42.9	437.5	2.06	-0.28	0.16	-0.05	4.89	0.0	0.0
1	1	87.99	6.81	94.81	3822.	2820.	167.1	73.3	794.4	42.9	437.5	2.06	-0.28	0.16	-0.05	4.89	0.0	0.0
1	1	88.06	6.80	94.86	3810.	2816.	167.9	74.2	776.8	45.0	436.7	2.08	-0.28	0.15	-0.05	4.95	0.0	0.0
1	1	88.12	6.78	94.90	3798.	2811.	168.5	75.0	759.1	47.0	435.8	2.10	-0.28	0.15	-0.05	5.01	0.0	0.0
1	1	88.19	6.76	94.95	3786.	2808.	170.1	76.0	740.0	49.3	435.0	2.12	-0.27	0.14	-0.05	5.07	0.0	0.0
1	1	88.19	6.76	94.95	3786.	2808.	170.1	76.0	740.0	49.3	435.0	2.12	-0.27	0.14	-0.05	5.07	0.0	0.0
1	1	88.25	6.75	95.00	3774.	2803.	171.3	76.8	722.3	51.2	434.1	2.15	-0.27	0.14	-0.06	5.14	0.0	0.0

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LOCATION 6 GUN TYPE 3 ERROR MODE 3 POSITION=(15600.0, 10900.0, 90.0) RADIUS= 0.0 M

L N	DEM	FIRE TIME	FLT. TIME	INTCP TIME	FIRE RANGE	INTCP RANGE	SIG1	SIG2	BIAS1	BIAS2	CLOSE VEL.	AZIM. RATE	ELEV. RATE	MEAN AZ.ERR	MEAN EL.ERR	VULN AREA	SHOT PK	CUM.PK
1	1	88.31	6.73	95.05	3762.	2799.	172.6	77.7	704.7	53.0	433.1	2.17	-0.27	0.13	-0.06	5.20	0.0	0.0
1	1	88.38	6.71	95.09	3749.	2795.	174.1	78.6	686.3	54.8	432.2	2.19	-0.27	0.12	-0.06	5.26	0.0	0.0
1	1	88.44	6.69	95.14	3737.	2791.	175.7	79.5	668.0	56.6	431.3	2.20	-0.27	0.11	-0.06	5.32	0.0	0.0
1	1	88.44	6.69	95.14	3737.	2791.	175.7	79.5	668.0	56.6	431.3	2.20	-0.27	0.11	-0.06	5.32	0.0	0.0
1	1	88.51	6.68	95.19	3725.	2787.	177.2	80.4	650.5	58.1	430.4	2.22	-0.28	0.11	-0.06	5.39	0.0	0.0
1	1	88.57	6.67	95.24	3713.	2783.	178.9	81.2	633.1	59.5	429.4	2.22	-0.28	0.10	-0.07	5.45	0.00000	0.00000
1	1	88.63	6.65	95.28	3701.	2779.	180.7	82.1	615.7	60.7	428.4	2.23	-0.29	0.09	-0.07	5.51	0.00000	0.00000
1	1	88.63	6.65	95.28	3701.	2779.	180.7	82.1	615.7	60.7	428.4	2.23	-0.29	0.09	-0.07	5.51	0.00000	0.00000
1	1	88.70	6.63	95.33	3689.	2775.	182.6	82.9	597.8	62.0	427.5	2.24	-0.29	0.09	-0.07	5.57	0.00000	0.00000
1	1	88.76	6.61	95.38	3677.	2772.	184.6	83.7	579.9	63.2	426.5	2.25	-0.30	0.08	-0.07	5.64	0.00000	0.00000
1	1	88.83	6.60	95.43	3665.	2768.	186.6	84.5	562.8	64.2	425.5	2.27	-0.30	0.08	-0.07	5.70	0.00000	0.00000
1	1	88.89	6.58	95.47	3653.	2764.	188.7	85.3	545.7	65.1	424.4	2.28	-0.30	0.07	-0.07	5.76	0.00000	0.00000
1	1	88.89	6.58	95.47	3653.	2764.	188.7	85.3	545.7	65.1	424.4	2.28	-0.30	0.07	-0.07	5.76	0.00000	0.00000
1	1	88.95	6.57	95.52	3641.	2760.	191.1	86.1	528.4	65.9	423.4	2.30	-0.31	0.06	-0.07	5.83	0.00000	0.00000
1	1	89.02	6.56	95.57	3629.	2756.	193.3	86.8	511.5	66.7	422.3	2.32	-0.31	0.06	-0.08	5.89	0.00000	0.00000
1	1	89.08	6.54	95.62	3618.	2752.	195.7	87.5	494.6	67.3	421.2	2.33	-0.31	0.05	-0.08	5.95	0.00000	0.00001
1	1	89.08	6.54	95.62	3618.	2752.	195.7	87.5	494.6	67.3	421.2	2.33	-0.31	0.05	-0.08	5.95	0.00000	0.00001
1	1	89.15	6.53	95.67	3606.	2749.	198.2	88.2	477.8	67.9	420.1	2.35	-0.31	0.04	-0.08	6.02	0.00000	0.00001
1	1	89.21	6.51	95.72	3594.	2745.	200.7	88.8	461.0	68.3	419.0	2.37	-0.31	0.04	-0.08	6.08	0.00000	0.00001
1	1	89.27	6.50	95.77	3582.	2741.	203.3	89.5	444.3	68.7	417.9	2.38	-0.32	0.03	-0.08	6.14	0.00000	0.00002
1	1	89.34	6.48	95.82	3570.	2738.	206.0	90.1	427.7	69.0	416.8	2.40	-0.32	0.02	-0.08	6.20	0.00000	0.00002
1	1	89.34	6.48	95.82	3570.	2738.	206.0	90.1	427.7	69.0	416.8	2.40	-0.32	0.02	-0.08	6.20	0.00000	0.00003
1	1	89.40	6.47	95.87	3559.	2734.	208.8	90.7	411.2	69.3	415.7	2.41	-0.32	0.02	-0.09	6.27	0.00001	0.00003
1	1	89.47	6.45	95.92	3547.	2731.	211.7	91.3	394.7	69.4	414.5	2.42	-0.33	0.01	-0.09	6.33	0.00001	0.00004
1	1	89.53	6.44	95.97	3535.	2727.	214.6	91.9	378.3	69.5	413.4	2.44	-0.33	0.00	-0.09	6.39	0.00001	0.00005
1	1	89.59	6.42	96.02	3523.	2724.	217.6	92.4	362.0	69.5	412.2	2.45	-0.34	-0.01	-0.09	6.46	0.00001	0.00006
1	1	89.59	6.42	96.02	3523.	2724.	217.6	92.4	362.0	69.5	412.2	2.45	-0.34	-0.01	-0.09	6.46	0.00001	0.00007
1	1	89.66	6.41	96.07	3512.	2720.	220.8	92.9	345.8	69.4	411.0	2.47	-0.34	-0.01	-0.09	6.52	0.00001	0.00008
1	1	89.72	6.39	96.12	3500.	2717.	224.0	93.4	329.6	69.2	409.8	2.49	-0.34	-0.02	-0.09	6.58	0.00001	0.00009
1	1	89.79	6.38	96.17	3488.	2714.	227.2	93.9	313.4	69.0	408.6	2.50	-0.35	-0.03	-0.10	6.64	0.00001	0.00010
1	1	89.79	6.38	96.17	3488.	2714.	227.2	93.9	313.4	69.0	408.6	2.50	-0.35	-0.03	-0.10	6.64	0.00001	0.00012
1	1	89.65	6.36	96.22	3477.	2710.	230.6	94.3	297.3	68.7	407.4	2.52	-0.35	-0.03	-0.10	6.70	0.00002	0.00014
1	1	89.91	6.36	96.27	3465.	2707.	233.9	94.7	282.9	68.2	406.0	2.54	-0.35	-0.04	-0.10	6.77	0.00002	0.00015
1	1	89.98	6.34	96.32	3454.	2704.	237.5	95.2	266.9	67.8	404.8	2.55	-0.36	-0.05	-0.10	6.83	0.00002	0.00017
1	1	90.04	6.33	96.37	3442.	2700.	241.1	95.6	250.9	67.3	403.5	2.57	-0.36	-0.05	-0.10	6.89	0.00002	0.00019
1	1	90.04	6.33	96.37	3442.	2700.	241.1	95.6	250.9	67.3	403.5	2.57	-0.36	-0.05	-0.10	6.89	0.00002	0.00022
1	1	90.11	6.31	96.42	3431.	2697.	244.9	95.9	235.0	66.8	402.3	2.59	-0.36	-0.06	-0.10	6.95	0.00002	0.00024
1	1	90.17	6.31	96.48	3419.	2694.	248.6	96.3	220.7	66.1	400.8	2.60	-0.37	-0.07	-0.11	7.02	0.00002	0.00026
1	1	90.23	6.29	96.53	3408.	2691.	252.5	96.6	204.8	65.4	399.5	2.62	-0.37	-0.08	-0.11	7.08	0.00003	0.00029
1	1	90.23	6.29	96.53	3408.	2691.	252.5	96.6	204.8	65.4	399.5	2.62	-0.37	-0.08	-0.11	7.08	0.00003	0.00032
1	1	90.30	6.28	96.58	3396.	2698.	256.5	97.0	189.0	64.7	398.2	2.64	-0.37	-0.08	-0.11	7.14	0.00003	0.00034
1	1	90.36	6.27	96.63	3385.	2685.	260.5	97.3	174.8	63.8	396.8	2.65	-0.38	-0.09	-0.11	7.20	0.00003	0.00037
1	1	90.43	6.25	96.68	3374.	2682.	264.8	97.6	159.0	63.0	395.4	2.67	-0.38	-0.10	-0.11	7.26	0.00003	0.00040
1	1	90.49	6.24	96.73	3362.	2679.	269.1	97.9	143.2	62.1	394.1	2.69	-0.39	-0.11	-0.11	7.33	0.00003	0.00044
1	1	90.49	6.24	96.73	3362.	2679.	269.1	97.9	143.2	62.1	394.1	2.69	-0.39	-0.11	-0.11	7.33	0.00003	0.00047
1	1	90.55	6.23	96.79	3351.	2676.	273.4	98.2	129.0	61.1	392.6	2.71	-0.39	-0.11	-0.12	7.39	0.00003	0.00050
1	1	90.62	6.22	96.84	3340.	2673.	278.0	98.4	113.2	60.1	391.2	2.72	-0.39	-0.12	-0.12	7.45	0.00003	0.00053
1	1	90.68	6.21	96.89	3328.	2670.	282.6	98.7	99.0	59.0	389.7	2.74	-0.40	-0.13	-0.12	7.51	0.00003	0.00057
1	1	90.68	6.21	96.89	3328.	2670.	282.6	98.7	99.0	59.0	389.7	2.74	-0.40	-0.13	-0.12	7.51	0.00003	0.00060
1	1	90.75	6.20	96.94	3317.	2668.	287.4	98.9	83.2	57.9	388.2	2.76	-0.40	-0.14	-0.12	7.58	0.00003	0.00063
1	1	90.81	6.19	97.00	3306.	2665.	292.2	99.2	68.9	56.7	386.7	2.78	-0.41	-0.15	-0.12	7.64	0.00003	0.00067

LOCATION 6 GUN TYPE 3 ERROR MODE 3 POSITION=(15600.0, 10900.0, 90.0) RADIUS= 0.0 M

L	N OEM	FIRE TIME	FLT. TIME	INTCP TIME	FIRE RANGE	INTCP RANGE	SIG1	SIG2	BIAS1	BIAS2	CLOSE VEL.	AZIM. RATE	ELEV. RATE	MEAN AZ.ERR	MEAN EL.ERR	VULN AREA	SHOT PK	CUM.PK
1	1	90.87	6.17	97.05	3295.	2662.	297.3	99.4	53.0	55.5	385.2	2.80	-0.41	-0.15	-0.12	7.70	0.00003	0.00070
1	1	90.94	6.17	97.11	3284.	2660.	302.4	99.6	38.7	54.3	383.6	2.81	-0.41	-0.16	-0.13	7.76	0.00004	0.00074
1	1	90.94	6.17	97.11	3284.	2660.	302.4	99.6	38.7	54.3	383.6	2.81	-0.41	-0.16	-0.13	7.76	0.00004	0.00077
1	1	91.00	6.16	97.16	3273.	2657.	307.7	99.8	23.5	53.0	382.1	2.83	-0.42	-0.17	-0.13	7.83	0.00004	0.00081
1	1	91.07	6.15	97.21	3262.	2654.	313.1	100.1	8.2	51.6	380.5	2.85	-0.42	-0.18	-0.13	7.89	0.00004	0.00084
1	1	91.13	6.14	97.27	3251.	2652.	318.7	100.3	6.3	50.2	378.8	2.87	-0.43	-0.18	-0.13	7.95	0.00003	0.00088
1	1	91.19	6.12	97.32	3240.	2650.	324.0	100.4	21.1	48.6	377.3	2.89	-0.43	-0.19	-0.13	8.01	0.00003	0.00091
1	1	91.19	6.12	97.32	3240.	2650.	324.0	100.4	21.1	48.6	377.3	2.89	-0.43	-0.19	-0.13	8.01	0.00003	0.00095
1	1	91.26	6.12	97.37	3231.	2647.	325.5	100.0	23.5	45.2	376.4	2.86	-0.43	-0.16	-0.09	8.06	0.00004	0.00098
1	1	91.32	6.11	97.43	3222.	2645.	326.7	99.5	23.8	42.0	375.5	2.50	-0.38	-0.11	-0.05	8.11	0.00004	0.00102
1	1	91.39	6.10	97.49	3213.	2642.	327.5	98.9	22.8	38.8	374.7	2.48	-0.36	-0.05	-0.01	8.16	0.00004	0.00106
1	1	91.39	6.10	97.49	3213.	2642.	327.5	98.9	22.8	38.8	374.7	2.48	-0.36	-0.05	-0.01	8.16	0.00004	0.00109
1	1	91.45	6.09	97.54	3204.	2640.	327.7	98.3	22.0	36.3	374.1	2.58	-0.18	-0.00	0.02	8.20	0.00004	0.00113
1	1	91.51	6.08	97.59	3196.	2638.	327.6	97.6	20.1	34.6	373.3	2.88	0.05	0.03	0.03	8.25	0.00004	0.00117
1	1	91.58	6.07	97.65	3187.	2636.	326.6	96.9	20.1	33.7	372.4	3.24	0.29	0.05	0.03	8.30	0.00004	0.00121
1	1	91.64	6.06	97.71	3178.	2634.	324.5	96.3	21.6	33.4	371.5	3.59	0.48	0.04	0.02	8.36	0.00004	0.00125
1	1	91.64	6.06	97.71	3178.	2634.	324.5	96.3	21.6	33.4	371.5	3.59	0.48	0.04	0.02	8.36	0.00004	0.00129
1	1	91.71	6.06	97.76	3170.	2631.	322.3	95.7	24.6	33.4	370.5	3.85	0.59	0.01	0.00	8.40	0.00004	0.00133
1	1	91.77	6.04	97.81	3161.	2629.	320.3	95.1	29.9	33.5	369.7	3.99	0.61	-0.02	-0.02	8.45	0.00004	0.00137
1	1	91.83	6.03	97.86	3153.	2625.	318.2	94.5	35.4	33.2	369.0	4.00	0.55	-0.05	-0.04	8.48	0.00004	0.00141
1	1	91.83	6.03	97.86	3153.	2625.	318.2	94.5	35.4	33.2	369.0	4.00	0.55	-0.05	-0.04	8.48	0.00004	0.00145
1	1	91.90	6.01	97.91	3144.	2621.	315.8	93.8	40.5	32.5	368.5	3.92	0.44	-0.07	-0.05	8.51	0.00004	0.00150
1	1	91.96	6.00	97.96	3136.	2617.	313.4	93.2	44.9	31.3	368.0	3.77	0.31	-0.09	-0.05	8.54	0.00004	0.00154
1	1	92.03	5.98	98.01	3128.	2612.	310.9	92.5	48.3	29.8	367.5	3.61	0.15	-0.09	-0.05	8.56	0.00004	0.00159
1	1	92.09	5.97	98.06	3120.	2609.	308.4	91.8	51.9	28.1	367.2	3.49	0.11	-0.08	-0.04	8.58	0.00005	0.00163
1	1	92.09	5.97	98.06	3120.	2609.	308.4	91.8	51.9	28.1	367.2	3.49	0.11	-0.08	-0.04	8.58	0.00005	0.00168
1	1	92.15	5.95	98.10	3111.	2605.	305.9	91.2	55.1	26.3	366.8	3.41	0.08	-0.07	-0.03	8.61	0.00005	0.00172
1	1	92.22	5.93	98.15	3103.	2601.	303.3	90.5	57.3	24.6	366.5	3.41	0.10	-0.06	-0.02	8.63	0.00005	0.00177
1	1	92.28	5.92	98.20	3095.	2597.	300.6	89.9	59.7	23.1	366.1	3.46	0.15	-0.04	-0.01	8.65	0.00005	0.00182
1	1	92.28	5.92	98.20	3095.	2597.	300.6	89.9	59.7	23.1	366.1	3.46	0.15	-0.04	-0.01	8.65	0.00005	0.00187
1	1	92.35	5.90	98.25	3087.	2593.	298.0	89.3	62.4	21.8	365.7	3.56	0.21	-0.04	-0.00	8.68	0.00005	0.00192
1	1	92.41	5.89	98.30	3079.	2589.	295.4	88.6	65.5	20.6	365.3	3.67	0.27	-0.03	-0.01	8.70	0.00005	0.00197
1	1	92.47	5.87	98.35	3071.	2585.	292.9	88.0	69.0	19.7	364.8	3.77	0.32	-0.04	-0.01	8.73	0.00005	0.00202
1	1	92.54	5.86	98.40	3063.	2581.	290.3	87.4	72.8	18.7	364.3	3.85	0.35	-0.05	-0.01	8.75	0.00005	0.00207
1	1	92.54	5.86	98.40	3063.	2581.	290.3	87.4	72.8	18.7	364.3	3.85	0.35	-0.05	-0.01	8.75	0.00005	0.00212
1	1	92.60	5.84	98.45	3055.	2577.	287.8	86.9	76.7	17.8	363.8	3.90	0.35	-0.06	-0.02	8.78	0.00005	0.00217
1	1	92.67	5.83	98.50	3048.	2574.	285.3	86.3	80.6	16.9	363.4	3.91	0.33	-0.06	-0.03	8.81	0.00005	0.00223
1	1	92.73	5.82	98.55	3040.	2570.	282.8	85.7	84.3	15.8	362.9	3.90	0.29	-0.07	-0.03	8.83	0.00005	0.00228
1	1	92.79	5.80	98.60	3032.	2566.	280.3	85.2	87.8	14.6	362.4	3.88	0.26	-0.08	-0.03	8.86	0.00006	0.00234
1	1	92.79	5.80	98.60	3032.	2566.	280.3	85.2	87.8	14.6	362.4	3.88	0.26	-0.08	-0.03	8.86	0.00006	0.00239
1	1	92.86	5.79	98.64	3025.	2563.	277.8	84.6	91.0	13.3	361.9	3.85	0.23	-0.08	-0.03	8.89	0.00006	0.00245
1	1	92.92	5.77	98.69	3017.	2559.	275.3	84.0	94.1	12.0	361.5	3.83	0.20	-0.08	-0.02	8.91	0.00006	0.00250
1	1	92.99	5.76	98.74	3009.	2556.	272.8	83.5	97.1	10.7	361.1	3.83	0.20	-0.07	-0.02	8.93	0.00006	0.00256
1	1	92.99	5.76	98.74	3009.	2556.	272.8	83.5	97.1	10.7	361.1	3.83	0.20	-0.07	-0.02	8.93	0.00006	0.00262
1	1	93.05	5.75	98.80	3002.	2552.	270.2	83.0	99.3	9.4	360.6	3.84	0.20	-0.07	-0.02	8.96	0.00006	0.00268
1	1	93.11	5.73	98.85	2995.	2548.	267.7	82.4	101.5	8.2	360.1	3.87	0.22	-0.07	-0.01	8.98	0.00006	0.00274
1	1	93.18	5.72	98.90	2987.	2545.	265.3	81.9	104.6	7.0	359.6	3.91	0.23	-0.07	-0.01	9.01	0.00006	0.00280
1	1	93.24	5.71	98.95	2980.	2542.	262.9	81.4	107.9	5.9	359.2	3.96	0.25	-0.07	-0.01	9.03	0.00006	0.00286
1	1	93.24	5.71	98.95	2980.	2542.	262.9	81.4	107.9	5.9	359.2	3.96	0.25	-0.07	-0.01	9.03	0.00006	0.00292
1	1	93.31	5.69	99.00	2973.	[illegible]38.	260.6	80.9	111.2	4.8	358.7	4.00	0.26	-0.07	-0.01	9.06	0.00006	0.00298
1	1	93.37	5.68	99.05	2965.	2535.	258.1	80.5	113.0	3.7	358.1	4.03	0.26	-0.07	-0.02	9.08	0.00006	0.00305

AFATL P-001 AAASIM * AIRCRAFT COMBAT SURVIVABILITY SCENARIO *

LOCATION 6 GUN TYPE 3 ERROR MODE 3 POSITION=(15600.0, 10900.0, 90.0) RADIUS= 0.0 M

L N	OEM	FIRE TIME	FLT. TIME	INTCP TIME	FIRE RANGE	INTCP RANGE	SIG1	SIG2	BIAS1	BIAS2	CLOSE VEL.	AZIM. RATE	ELEV. RATE	MEAN AZ.ERR	MEAN EL.ERR	VULN AREA	SHOT PK	CUM.PK
1	1	93.43	5.67	99.10	2958.	2532.	255.5	80.0	116.4	2.6	357.6	4.06	0.26	-0.08	-0.02	9.11	0.00006	0.00311
1	1	93.43	5.67	99.10	2958.	2532.	255.5	80.0	116.4	2.6	357.6	4.06	0.26	-0.08	-0.02	9.11	0.00006	0.00317
1	1	93.50	5.65	99.15	2951.	2529.	253.7	79.5	119.9	1.5	357.1	4.08	0.25	-0.08	-0.02	9.13	0.00006	0.00324
1	1	93.56	5.65	99.21	2944.	2525.	251.4	79.1	121.6	0.4	356.6	4.09	0.24	-0.08	-0.02	9.16	0.00007	0.00330
1	1	93.63	5.63	99.26	2937.	2522.	250.0	78.6	125.0	0.7	356.1	4.09	0.23	-0.09	-0.02	9.18	0.00007	0.00337
1	1	93.69	5.62	99.31	2930.	2519.	250.2	78.2	128.3	1.9	355.6	4.10	0.22	-0.09	-0.02	9.21	0.00007	0.00343
1	1	93.69	5.62	99.31	2930.	2519.	250.2	78.2	128.3	1.9	355.6	4.10	0.22	-0.09	-0.02	9.21	0.00007	0.00350
1	1	93.75	5.61	99.36	2924.	2516.	250.1	77.8	129.9	3.0	355.0	4.11	0.21	-0.09	-0.02	9.24	0.00007	0.00357
1	1	93.82	5.60	99.41	2917.	2513.	250.3	77.5	133.2	4.2	354.5	4.13	0.21	-0.09	-0.02	9.26	0.00007	0.00363
1	1	93.88	5.59	99.47	2910.	2510.	250.4	77.1	134.8	5.3	353.9	4.14	0.21	-0.09	-0.01	9.29	0.00007	0.00370
1	1	93.88	5.59	99.47	2910.	2510.	250.4	77.1	134.8	5.3	353.9	4.14	0.21	-0.09	-0.01	9.29	0.00007	0.00376
1	1	93.95	5.57	99.52	2903.	2507.	250.7	76.7	138.1	6.5	353.4	4.17	0.21	-0.09	-0.01	9.31	0.00007	0.00383
1	1	94.01	5.57	99.58	2897.	2504.	250.8	76.4	139.8	7.6	352.9	4.19	0.21	-0.09	-0.01	9.34	0.00007	0.00389
1	1	94.07	5.55	99.63	2890.	2501.	251.1	76.0	143.2	8.7	352.3	4.22	0.22	-0.09	-0.01	9.36	0.00007	0.00396
1	1	94.14	5.54	99.68	2884.	2498.	251.3	75.7	145.0	9.8	351.7	4.24	0.22	-0.09	-0.01	9.39	0.00007	0.00403
1	1	94.14	5.54	99.68	2884.	2498.	251.3	75.7	145.0	9.8	351.7	4.24	0.22	-0.09	-0.01	9.39	0.00007	0.00409
1	1	94.20	5.53	99.73	2877.	2496.	251.8	75.4	148.5	10.9	351.2	4.26	0.22	-0.09	-0.01	9.42	0.00007	0.00416
1	1	94.27	5.52	99.79	2871.	2493.	252.0	75.1	150.3	11.9	350.6	4.28	0.21	-0.10	-0.01	9.44	0.00007	0.00422
1	1	94.33	5.52	99.85	2865.	2490.	252.3	74.8	152.2	13.0	350.0	4.30	0.21	-0.10	-0.01	9.47	0.00007	0.00429
1	1	94.39	5.50	99.89	2859.	2488.	252.8	74.5	155.7	14.1	349.5	4.32	0.20	-0.10	-0.01	9.49	0.00007	0.00435
1	1	94.39	5.50	99.89	2859.	2488.	252.8	74.5	155.7	14.1	349.5	4.32	0.20	-0.10	-0.01	9.49	0.00007	0.00442
1	1	94.46	5.49	99.95	2853.	2486.	253.2	74.2	157.6	15.2	348.8	4.33	0.20	-0.10	-0.01	9.52	0.00006	0.00448
1	1	94.52	5.49	100.01	2846.	2483.	253.6	74.0	159.5	16.3	348.2	4.35	0.19	-0.10	-0.01	9.54	0.00006	0.00455
1	1	94.59	5.47	100.06	2840.	2481.	254.1	73.7	162.2	17.4	347.6	4.37	0.19	-0.10	-0.01	9.57	0.00006	0.00461
1	1	94.59	5.47	100.06	2840.	2481.	254.1	73.7	162.2	17.4	347.6	4.37	0.19	-0.10	-0.01	9.57	0.00006	0.00467
1	1	94.65	5.46	100.11	2834.	2478.	254.7	73.5	165.0	18.5	347.0	4.38	0.19	-0.10	-0.01	9.60	0.00006	0.00474
1	1	94.71	5.46	100.17	2829.	2476.	255.2	73.3	167.0	19.5	346.4	4.40	0.18	-0.10	-0.01	9.62	0.00006	0.00480
1	1	94.78	5.45	100.23	2823.	2474.	255.8	73.1	169.0	20.6	345.8	4.42	0.18	-0.10	-0.01	9.65	0.00006	0.00487
1	1	94.84	5.44	100.28	2817.	2472.	256.3	72.9	171.0	21.6	345.1	4.44	0.18	-0.11	-0.01	9.67	0.00006	0.00493
1	1	94.84	5.44	100.28	2817.	2472.	256.3	72.9	171.0	21.6	345.1	4.44	0.18	-0.11	-0.01	9.67	0.00006	0.00499
1	1	94.91	5.43	100.34	2811.	2469.	257.0	72.7	173.1	22.7	344.5	4.46	0.18	-0.11	-0.01	9.70	0.00006	0.00505
1	1	94.97	5.43	100.40	2806.	2467.	257.6	72.5	175.2	23.7	343.8	4.48	0.18	-0.11	-0.01	9.73	0.00006	0.00512
1	1	95.03	5.42	100.45	2800.	2465.	258.3	72.4	177.4	24.8	343.1	4.50	0.17	-0.11	-0.01	9.75	0.00006	0.00518
1	1	95.03	5.42	100.45	2800.	2465.	258.3	72.4	177.4	24.8	343.1	4.50	0.17	-0.11	-0.01	9.75	0.00006	0.00524
1	1	95.10	5.41	100.51	2795.	2463.	259.1	72.2	179.7	25.8	342.5	4.52	0.17	-0.11	-0.01	9.78	0.00006	0.00530
1	1	95.16	5.41	100.57	2789.	2462.	259.8	72.1	181.9	26.9	341.8	4.53	0.17	-0.11	-0.01	9.80	0.00006	0.00536
1	1	95.23	5.40	100.62	2784.	2460.	260.7	72.0	184.2	27.9	341.1	4.55	0.16	-0.11	-0.01	9.83	0.00006	0.00542
1	1	95.29	5.39	100.66	2779.	2458.	261.5	71.9	186.6	28.9	340.4	4.57	0.16	-0.11	-0.01	9.86	0.00006	0.00548
1	1	95.29	5.39	100.68	2779.	2459.	261.5	71.9	186.6	28.9	340.4	4.57	0.16	-0.11	-0.01	9.86	0.00006	0.00554
1	1	95.35	5.38	100.74	2773.	2456.	262.5	71.8	189.0	30.0	339.7	4.58	0.15	-0.11	-0.01	9.88	0.00006	0.00560
1	1	95.42	5.38	100.79	2768.	2455.	263.4	71.7	191.5	31.0	339.0	4.60	0.15	-0.11	-0.01	9.91	0.00006	0.00565
1	1	95.48	5.38	100.86	2763.	2453.	264.2	71.6	192.3	32.0	338.2	4.61	0.15	-0.11	-0.01	9.93	0.00006	0.00571
1	1	95.48	5.38	100.86	2763.	2453.	264.2	71.6	192.3	32.0	338.2	4.61	0.15	-0.11	-0.01	9.93	0.00006	0.00577
1	1	95.55	5.37	100.91	2758.	2452.	265.3	71.6	194.9	33.0	337.5	4.63	0.14	-0.11	-0.01	9.96	0.00006	0.00583
1	1	95.61	5.36	100.97	2753.	2450.	266.4	71.5	197.5	34.1	336.8	4.65	0.14	-0.12	-0.01	9.98	0.00006	0.00588
1	1	95.67	5.35	101.03	2748.	2449.	267.5	71.5	200.2	35.1	336.1	4.66	0.14	-0.12	-0.01	9.99	0.00006	0.00594
1	1	95.74	5.35	101.09	2744.	2448.	268.5	71.5	201.3	36.1	335.3	4.68	0.13	-0.12	-0.00	9.99	0.00006	0.00599
1	1	95.74	5.35	101.09	2744.	2448.	268.5	71.5	201.3	36.1	335.3	4.68	0.13	-0.12	-0.00	9.99	0.00006	0.00605
1	1	95.80	5.35	101.15	2739.	2447.	269.8	71.5	204.1	37.1	334.5	4.70	0.13	-0.12	-0.00	10.00	0.00005	0.00610
1	1	95.87	5.35	101.21	2734.	2446.	270.9	71.5	205.3	38.1	333.7	4.71	0.13	-0.12	-0.00	10.01	0.00005	0.00616
1	1	95.93	5.34	101.27	2730.	2445.	272.2	71.5	208.3	39.1	332.9	4.73	0.12	-0.12	-0.00	10.02	0.00005	0.00621

AFATL P-001 AAASIM * AIRCRAFT COMBAT SURVIVABILITY SCENARIO *

LOCATION 6 GUN TYPE 3 ERROR MODE 3 POSITION=(15600.0, 10900.0, 90.0) RADIUS= 0.0 M

L N	DEM	FIRE TIME	FLT. TIME	INTCP TIME	FIRE RANGE	INTCP RANGE	SIG1	SIG2	BIAS1	BIAS2	CLOSE VEL.	AZIM. RATE	ELEV. RATE	MEAN AZ.ERR	MEAN EL.ERR	VULN AREA	SHOT PK	CUM.PK
1	1	95.99	5.34	101.33	2725.	2444.	273.5	71.6	209.7	40.0	332.1	4.75	0.12	-0.12	-0.00	10.03	0.00005	0.00626
1	1	95.99	5.34	101.33	2725.	2444.	273.5	71.6	209.7	40.0	332.1	4.75	0.12	-0.12	-0.00	10.03	0.00005	0.00631
1	1	96.06	5.33	101.39	2721.	2443.	274.9	71.6	212.9	41.1	331.3	4.76	0.11	-0.12	-0.00	10.04	0.00005	0.00636
1	1	96.12	5.33	101.45	2717.	2442.	276.3	71.7	214.4	42.0	330.4	4.78	0.11	-0.12	-0.00	10.05	0.00005	0.00641
1	1	96.19	5.32	101.51	2712.	2441.	277.9	71.8	217.7	43.1	329.6	4.79	0.10	-0.12	-0.00	10.05	0.00005	0.00646
1	1	96.19	5.32	101.51	2712.	2441.	277.9	71.8	217.7	43.1	329.6	4.79	0.10	-0.12	-0.00	10.05	0.00005	0.00651
1	1	96.25	5.32	101.57	2708.	2441.	279.3	71.9	219.4	44.0	328.7	4.80	0.10	-0.12	-0.00	10.06	0.00005	0.00656
1	1	96.31	5.32	101.64	2704.	2440.	280.9	72.0	221.2	45.0	327.9	4.82	0.10	-0.12	-0.00	10.07	0.00005	0.00661
1	1	96.38	5.32	101.70	2700.	2440.	282.5	72.1	223.1	46.0	327.0	4.83	0.09	-0.12	-0.00	10.08	0.00005	0.00665
1	1	96.44	5.32	101.76	2696.	2439.	284.4	72.3	226.8	47.0	326.1	4.85	0.09	-0.12	0.00	10.09	0.00005	0.00670
1	1	96.44	5.32	101.76	2696.	2439.	284.4	72.3	226.8	47.0	326.1	4.85	0.09	-0.12	0.00	10.09	0.00005	0.00674
1	1	96.51	5.32	101.82	2692.	2439.	286.2	72.4	228.9	48.0	325.2	4.86	0.08	-0.12	0.00	10.10	0.00005	0.00679
1	1	96.57	5.32	101.89	2688.	2439.	288.0	72.9	231.1	48.9	324.3	4.87	0.08	-0.12	0.00	10.10	0.00004	0.00683
1	1	96.63	5.32	101.95	2685.	2439.	289.9	73.4	233.5	49.9	323.3	4.89	0.07	-0.12	0.00	10.11	0.00004	0.00688
1	1	96.63	5.32	101.95	2685.	2439.	289.9	73.4	233.5	49.9	323.3	4.89	0.07	-0.12	0.00	10.11	0.00004	0.00692
1	1	96.70	5.32	102.02	2681.	2439.	292.0	74.0	235.9	50.9	322.4	4.90	0.07	-0.12	0.00	10.12	0.00004	0.00696
1	1	96.76	5.32	102.08	2677.	2439.	294.1	74.6	238.5	51.8	321.4	4.91	0.06	-0.12	0.00	10.13	0.00004	0.00700
1	3	96.83	5.32	102.14	2674.	2439.	50.5	31.3	189.7	25.3	324.7	4.15	-0.02	-0.07	0.01	10.15	0.00000	0.00700
1	3	96.89	5.32	102.21	2670.	2439.	50.3	30.7	178.1	25.6	324.9	4.17	-0.02	-0.03	0.01	10.16	0.00000	0.00700
1	3	96.89	5.32	102.21	2670.	2439.	50.3	30.7	178.1	25.6	324.9	4.17	-0.02	-0.03	0.01	10.16	0.00000	0.00700
1	3	96.95	5.32	102.28	2667.	2439.	49.1	30.3	165.4	26.2	324.9	4.18	-0.03	0.02	0.02	10.16	0.00000	0.00701
1	3	97.02	5.32	102.34	2664.	2440.	49.2	29.8	159.5	26.6	324.6	4.41	-0.01	0.06	0.02	10.17	0.00000	0.00701
1	3	97.08	5.32	102.41	2661.	2440.	49.4	29.4	160.3	26.9	323.8	4.71	0.01	0.07	0.03	10.18	0.00000	0.00702
1	3	97.08	5.32	102.41	2661.	2440.	49.4	29.4	160.3	26.9	323.8	4.71	0.01	0.07	0.03	10.18	0.00000	0.00702
1	3	97.15	5.32	102.47	2658.	2441.	49.9	29.0	167.4	27.2	322.5	5.02	0.04	0.07	0.03	10.19	0.00000	0.00702
1	3	97.21	5.33	102.54	2655.	2442.	49.5	28.7	177.8	27.7	320.7	5.26	0.06	0.05	0.02	10.20	0.00000	0.00702
1	3	97.27	5.33	102.61	2652.	2443.	50.3	28.4	192.6	28.0	318.8	5.41	0.07	0.03	0.02	10.21	0.00000	0.00702
1	3	97.34	5.34	102.68	2649.	2444.	50.1	28.1	205.8	28.6	316.8	5.44	0.07	0.00	0.02	10.22	0.00000	0.00702
1	3	97.34	5.34	102.68	2649.	2444.	50.1	28.1	205.8	28.6	316.8	5.44	0.07	0.00	0.02	10.22	0.00000	0.00702
1	3	97.40	5.34	102.74	2646.	2445.	50.9	27.8	218.7	28.9	315.0	5.38	0.05	-0.02	0.02	10.23	0.00000	0.00702
1	3	97.47	5.35	102.81	2643.	2446.	50.7	27.6	226.5	29.4	313.5	5.25	0.03	-0.03	0.02	10.23	0.0	0.00702
1	3	97.53	5.35	102.88	2641.	2448.	50.5	27.3	230.4	30.0	312.2	5.11	0.01	-0.04	0.02	10.24	0.0	0.00702
1	3	97.59	5.35	102.95	2638.	2449.	51.3	27.1	232.8	30.2	311.3	4.98	-0.01	-0.03	0.02	10.25	0.0	0.00702
1	3	97.59	5.35	102.95	2638.	2449.	51.3	27.1	232.8	30.2	311.3	4.98	-0.01	-0.03	0.02	10.25	0.0	0.00702
1	3	97.66	5.36	103.02	2636.	2450.	51.1	26.9	231.3	30.7	310.4	4.90	-0.02	-0.02	0.02	10.26	0.0	0.00702
1	3	97.72	5.37	103.09	2633.	2452.	51.0	26.7	229.3	31.1	309.7	4.87	-0.03	-0.01	0.02	10.26	0.0	0.00702
1	3	97.79	5.38	103.16	2630.	2454.	49.7	26.5	228.1	31.2	308.8	4.90	-0.03	-0.00	0.03	10.27	0.0	0.00702
1	3	97.79	5.38	103.16	2630.	2454.	49.7	26.5	228.1	31.2	308.8	4.90	-0.03	-0.00	0.03	10.27	0.0	0.00702
1	3	97.85	5.38	103.23	2626.	2456.	49.5	26.3	228.5	31.5	307.8	4.96	-0.03	-0.00	0.03	10.28	0.0	0.00702
1	3	97.91	5.39	103.30	2621.	2458.	48.4	26.1	231.1	31.4	306.7	5.05	-0.02	-0.01	0.03	10.29	0.0	0.00702
1	3	97.98	5.40	103.38	2615.	2460.	49.7	26.1	234.4	31.5	305.5	5.11	-0.01	-0.03	0.04	10.29	0.0	0.00702
1	3	98.04	5.41	103.45	2610.	2462.	49.1	26.0	237.2	31.3	304.4	5.14	0.01	-0.04	0.04	10.31	0.0	0.00702
1	3	98.04	5.41	103.45	2610.	2462.	49.1	26.0	237.2	31.3	304.4	5.14	0.01	-0.04	0.04	10.31	0.0	0.00702
1	3	98.11	5.42	103.53	2604.	2465.	48.5	26.0	235.0	30.8	303.4	5.10	0.03	-0.06	0.04	10.32	0.0	0.00702
1	3	98.17	5.43	103.60	2599.	2467.	48.9	25.9	230.3	29.5	302.9	5.02	0.05	-0.06	0.04	10.33	0.0	0.00702
1	3	98.23	5.43	103.67	2594.	2470.	49.4	25.9	221.5	27.8	302.7	4.94	0.06	-0.06	0.03	10.34	0.0	0.00702
1	3	98.23	5.43	103.67	2594.	2470.	49.4	25.9	221.5	27.8	302.7	4.94	0.06	-0.06	0.03	10.34	0.0	0.00702
1	3	98.30	5.45	103.75	2585.	2473.	48.8	25.8	207.9	26.1	302.7	4.88	0.07	-0.06	0.03	10.34	0.00000	0.00702
1	3	98.36	5.46	103.82	2584.	2476.	49.3	25.8	194.4	24.1	302.9	4.84	0.06	-0.05	0.03	10.35	0.00000	0.00702
1	3	98.43	5.47	103.90	2579.	2479.	48.8	25.8	179.0	22.5	303.0	4.85	0.04	-0.04	0.03	10.35	0.00000	0.00702
1	3	98.49	5.48	103.97	2574.	2482.	49.5	25.7	166.3	20.9	303.1	4.89	0.02	-0.03	0.02	10.36	0.00000	0.00703

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AFATL P-001 AAASIM * AIRCRAFT COMBAT SURVIVABILITY SCENARIO * PAGE 19

LOCATION 6 GUN TYPE 3 ERROR MODE 3 POSITION=(15600.0, 10900.0, 90.0) RADIUS= 0.0 M

L N	OEM	FIRE TIME	FLT. TIME	INTCP TIME	FIRE RANGE	INTCP RANGE	SIG1	SIG2	BIAS1	BIAS2	CLOSE VEL.	AZIM. RATE	ELEV. RATE	MEAN AZ.ERR	MEAN EL.ERR	VULN AREA	SHOT PK	CUM.PK
1	3	98.49	5.48	103.97	2574.	2482.	49.5	25.7	166.3	20.9	303.1	4.89	0.02	-0.03	0.02	10.36	0.00000	0.00703
1	3	98.55	5.49	104.05	2569.	2486.	49.3	25.7	153.7	19.8	303.1	4.95	0.00	-0.02	0.02	10.36	0.00001	0.00704
1	3	98.62	5.51	104.13	2565.	2489.	49.2	25.7	143.2	19.0	302.8	5.02	-0.01	-0.02	0.02	10.37	0.00001	0.00705
1	3	98.68	5.52	104.20	2560.	2493.	49.2	25.7	134.6	18.3	302.4	5.08	-0.02	-0.02	0.02	10.38	0.00002	0.00708
1	3	98.68	5.52	104.20	2560.	2493.	49.2	25.7	134.6	18.3	302.4	5.08	-0.02	-0.02	0.02	10.38	0.00002	0.00710
1	3	98.75	5.53	104.28	2555.	2495.	49.5	25.6	129.4	18.0	302.0	5.14	-0.03	-0.02	0.02	10.38	0.00003	0.00713
1	3	98.81	5.52	104.33	2551.	2493.	48.8	25.5	128.9	18.9	301.9	5.17	-0.03	-0.02	0.03	10.38	0.00003	0.00717
1	3	98.87	5.51	104.38	2547.	2490.	49.5	25.4	130.5	19.6	301.7	5.19	-0.03	-0.03	0.03	10.38	0.00003	0.00719
1	3	98.94	5.49	104.43	2542.	2485.	48.7	25.3	132.5	20.8	301.7	5.19	-0.02	-0.03	0.02	10.39	0.00002	0.00722
1	3	98.94	5.49	104.43	2542.	2485.	48.7	25.3	132.5	20.8	301.7	5.19	-0.02	-0.03	0.02	10.38	0.00002	0.00724
1	3	99.00	5.48	104.48	2538.	2481.	48.0	25.2	134.4	22.0	301.6	5.18	-0.02	-0.03	0.02	10.38	0.00002	0.00726
1	3	99.07	5.46	104.52	2534.	2477.	49.0	25.0	137.8	22.7	301.6	5.17	-0.02	-0.03	0.02	10.38	0.00002	0.00728
1	3	99.13	5.44	104.57	2530.	2472.	48.3	24.9	139.5	23.8	301.6	5.17	-0.03	-0.02	0.02	10.38	0.00001	0.00729
1	3	99.13	5.44	104.57	2530.	2472.	48.3	24.9	139.5	23.8	301.6	5.17	-0.03	-0.02	0.02	10.38	0.00001	0.00730
1	3	99.19	5.43	104.62	2526.	2467.	47.7	24.8	141.3	25.0	301.5	5.17	-0.04	-0.02	0.02	10.38	0.00001	0.00731
1	3	99.26	5.41	104.67	2522.	2463.	47.9	24.7	144.3	26.1	301.5	5.18	-0.04	-0.02	0.02	10.38	0.00001	0.00732
1	3	99.32	5.39	104.72	2518.	2459.	47.4	24.6	146.9	27.5	301.4	5.21	-0.05	-0.01	0.02	10.38	0.00001	0.00733
1	3	99.39	5.38	104.76	2515.	2455.	47.7	24.5	150.9	28.8	301.3	5.23	-0.06	-0.01	0.02	10.37	0.00000	0.00733
1	3	99.39	5.38	104.76	2515.	2455.	47.7	24.5	150.9	28.8	301.3	5.23	-0.06	-0.01	0.02	10.37	0.00000	0.00734
1	3	99.45	5.36	104.81	2511.	2450.	47.3	24.4	154.7	30.4	301.1	5.26	-0.07	-0.01	0.02	10.37	0.00000	0.00734
1	3	99.51	5.35	104.86	2507.	2446.	46.9	24.2	159.0	32.0	300.9	5.29	-0.08	-0.01	0.02	10.37	0.00000	0.00734
1	3	99.58	5.33	104.91	2504.	2441.	46.5	24.1	163.7	33.7	300.7	5.31	-0.08	-0.01	0.02	10.37	0.00000	0.00735
1	3	99.64	5.31	104.96	2501.	2438.	47.0	24.0	169.5	35.2	300.4	5.33	-0.09	-0.01	0.02	10.37	0.00000	0.00735
1	3	99.64	5.31	104.96	2501.	2438.	47.0	24.0	169.5	35.2	300.4	5.33	-0.09	-0.01	0.02	10.37	0.00000	0.00735
1	3	99.71	5.30	105.00	2497.	2433.	46.7	23.9	174.7	36.9	300.2	5.35	-0.09	-0.01	0.01	10.37	0.00000	0.00735
1	3	99.77	5.28	105.05	2494.	2429.	46.5	23.8	180.0	38.6	299.9	5.36	-0.10	-0.01	0.01	10.37	0.00000	0.00735
1	3	99.83	5.27	105.10	2491.	2425.	47.1	23.7	186.1	40.0	299.6	5.36	-0.10	-0.01	0.01	10.37	0.00000	0.00735
1	3	99.83	5.27	105.10	2491.	2425.	47.1	23.7	186.1	40.0	299.6	5.36	-0.10	-0.01	0.01	10.37	0.00000	0.00735
1	3	99.90	5.25	105.15	2488.	2421.	46.9	23.6	191.4	41.6	299.4	5.37	-0.10	-0.01	0.01	10.37	0.00000	0.00735
1	3	99.96	5.24	105.20	2485.	2417.	46.8	23.5	196.8	43.3	299.1	5.38	-0.11	-0.01	0.01	10.36	0.0	0.00735
1	3	100.03	5.22	105.25	2482.	2413.	46.7	23.5	202.3	45.0	298.8	5.39	-0.12	-0.01	0.01	10.36	0.0	0.00735
1	3	100.09	5.21	105.30	2479.	2409.	46.6	23.4	207.9	46.7	298.5	5.40	-0.12	-0.00	0.01	10.36	0.0	0.00735
1	3	100.09	5.21	105.30	2479.	2409.	46.6	23.4	207.9	46.7	298.5	5.40	-0.12	-0.00	0.01	10.36	0.0	0.00735
1	3	100.15	5.19	105.35	2477.	2405.	46.5	23.1	213.8	48.4	298.2	5.41	-0.13	-0.00	0.01	10.36	0.0	0.00735
1	3	100.22	5.18	105.40	2474.	2401.	45.6	22.6	219.0	50.4	297.9	5.43	-0.14	-0.00	0.01	10.35	0.0	0.00735
1	3	100.28	5.17	105.45	2472.	2397.	45.6	22.5	225.3	52.2	297.6	5.44	-0.14	-0.00	0.01	10.35	0.0	0.00735
1	3	100.28	5.17	105.45	2472.	2397.	45.6	22.5	225.3	52.2	297.6	5.44	-0.14	-0.00	0.01	10.35	0.0	0.00735
1	3	100.35	5.15	105.50	2469.	2394.	45.6	22.3	231.7	54.0	297.2	5.45	-0.15	0.00	0.01	10.35	0.0	0.00735
1	3	100.41	5.14	105.55	2467.	2390.	44.5	22.0	237.5	56.0	296.9	5.47	-0.16	0.00	0.01	10.34	0.0	0.00735
1	3	100.47	5.13	105.60	2465.	2386.	45.0	21.8	244.3	57.8	296.5	5.48	-0.16	0.00	0.00	10.34	0.0	0.00735
1	3	100.54	5.11	105.65	2463.	2382.	45.3	21.8	251.2	59.6	296.1	5.49	-0.17	0.00	0.00	10.34	0.0	0.00735
1	3	100.54	5.11	105.65	2463.	2382.	45.3	21.8	251.2	59.6	296.1	5.49	-0.17	0.00	0.00	10.34	0.0	0.00735
1	3	100.60	5.10	105.70	2461.	2379.	45.5	21.7	258.2	61.3	295.8	5.50	-0.17	0.00	0.00	10.33	0.0	0.00735
1	3	100.67	5.09	105.75	2459.	2375.	45.1	21.7	264.4	63.4	295.4	5.50	-0.18	0.00	0.00	10.33	0.0	0.00735
1	3	100.73	5.08	105.81	2457.	2371.	44.7	21.7	270.6	65.4	295.0	5.51	-0.19	0.00	0.00	10.32	0.0	0.00735
1	3	100.73	5.08	105.81	2457.	2371.	44.7	21.7	270.6	65.4	295.0	5.51	-0.19	0.00	0.00	10.32	0.0	0.00735
1	3	100.79	5.06	105.85	2455.	2368.	45.1	21.6	277.8	67.1	294.6	5.52	-0.19	0.00	0.00	10.32	0.0	0.00735
1	3	100.86	5.05	105.90	2453.	2365.	45.5	21.6	286.5	68.9	294.1	5.52	-0.20	0.01	-0.00	10.31	0.0	0.00735
1	3	100.92	5.04	105.96	2452.	2361.	45.2	21.5	293.1	70.9	293.7	5.53	-0.20	0.01	-0.00	10.31	0.0	0.00735
1	3	100.99	5.02	106.01	2450.	2358.	45.0	21.5	299.9	72.9	293.3	5.54	-0.21	0.01	-0.00	10.30	0.0	0.00735
1	3	100.99	5.02	106.01	2450.	2358.	45.0	21.5	299.9	72.9	293.3	5.54	-0.21	0.01	-0.00	10.30	0.0	0.00735

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LOCATION 6 GUN TYPE 3 ERROR MODE 3 POSITION=(15600.0, 10900.0, 90.0) RADIUS= 0.0 M

L N	UEM	FIRE TIME	FLT. TIME	INTCP TIME	FIRE RANGE	INTCP RANGE	SIG1	SIG2	BIAS1	BIAS2	CLOSE VEL.	AZIM. RATE	ELEV. RATE	MEAN AZ.ERR	MEAN EL.ERR	VULN AREA	SHOT_PK	CUM.PK
1	3	101.05	5.01	106.06	2449.	2355.	45.6	21.5	307.7	74.6	292.8	5.55	-0.22	0.01	-0.00	10.30	0.0	0.00735
1	3	101.11	5.00	106.12	2447.	2351.	44.7	21.4	313.8	76.9	292.4	5.55	-0.22	0.01	-0.00	10.29	0.0	0.00735
1	3	101.18	4.99	106.17	2446.	2348.	45.3	21.4	321.8	78.5	291.9	5.56	-0.23	0.01	-0.00	10.28	0.0	0.00735
1	3	101.24	4.98	106.22	2445.	2345.	45.3	21.4	329.1	80.5	291.5	5.56	-0.24	0.01	-0.00	10.28	0.0	0.00735
1	3	101.24	4.98	106.22	2445.	2345.	45.3	21.4	329.1	80.5	291.5	5.56	-0.24	0.01	-0.00	10.28	0.0	0.00735
1	3	101.31	4.97	106.27	2444.	2342.	45.3	21.3	336.4	82.4	291.0	5.57	-0.24	0.01	-0.01	10.27	0.0	0.00735
1	3	101.37	4.95	106.32	2443.	2338.	45.3	21.3	343.9	84.3	290.5	5.57	-0.25	0.01	-0.01	10.26	0.0	0.00735
1	3	101.43	4.94	106.38	2442.	2335.	45.4	21.3	351.5	86.2	290.0	5.58	-0.25	0.01	-0.01	10.25	0.0	0.00735
1	3	101.43	4.94	106.38	2442.	2335.	45.4	21.3	351.5	86.2	290.0	5.58	-0.25	0.01	-0.01	10.25	0.0	0.00735
1	3	101.50	4.93	106.43	2441.	2332.	45.5	21.3	359.2	88.0	289.5	5.58	-0.26	0.01	-0.01	10.24	0.0	0.00735
1	3	101.56	4.92	106.48	2441.	2329.	45.7	21.2	367.0	89.9	289.0	5.58	-0.27	0.01	-0.01	10.24	0.0	0.00735
1	3	101.63	4.91	106.54	2440.	2326.	45.2	21.2	374.1	92.0	288.5	5.59	-0.27	0.01	-0.01	10.23	0.0	0.00735
1	3	101.69	4.90	106.59	2440.	2324.	46.1	21.2	383.1	93.4	288.0	5.59	-0.28	0.01	-0.01	10.22	0.0	0.00735
1	3	101.69	4.90	106.59	2440.	2324.	46.1	21.2	383.1	93.4	288.0	5.59	-0.28	0.01	-0.01	10.22	0.0	0.00735
1	3	101.75	4.89	106.65	2439.	2321.	45.8	21.2	390.4	95.5	287.5	5.59	-0.28	0.01	-0.01	10.23	0.0	0.00735
1	3	101.82	4.88	106.70	2439.	2318.	46.1	21.1	398.8	97.2	286.9	5.59	-0.29	0.01	-0.01	10.25	0.0	0.00735
1	3	101.88	4.87	106.75	2439.	2316.	46.5	21.1	407.3	98.9	286.4	5.59	-0.30	0.01	-0.01	10.28	0.0	0.00735
1	3	101.88	4.87	106.75	2439.	2316.	46.5	21.1	407.3	98.9	286.4	5.59	-0.30	0.01	-0.01	10.28	0.0	0.00735
1	3	101.95	4.86	106.81	2439.	2313.	46.3	21.1	415.0	100.9	285.8	5.59	-0.30	0.01	-0.01	10.30	0.0	0.00735
1	3	102.01	4.86	106.87	2439.	2310.	46.1	21.1	423.0	102.8	285.2	5.59	-0.31	0.01	-0.01	10.33	0.0	0.00735
1	3	102.07	4.85	106.92	2439.	2308.	46.0	21.1	431.0	104.7	284.6	5.59	-0.31	0.01	-0.02	10.35	0.0	0.00735
1	3	102.14	4.83	106.97	2439.	2306.	47.2	21.0	441.1	105.9	284.0	5.59	-0.32	0.01	-0.02	10.38	0.0	0.00735
1	3	102.14	4.83	106.97	2439.	2306.	47.2	21.0	441.1	105.9	284.0	5.59	-0.32	0.01	-0.02	10.38	0.0	0.00735
1	3	102.20	4.83	107.03	2439.	2303.	47.2	21.0	449.5	107.7	283.4	5.59	-0.33	0.01	-0.02	10.40	0.0	0.00735
1	3	102.27	4.82	107.08	2439.	2301.	47.2	21.0	458.0	109.5	282.7	5.59	-0.33	0.01	-0.02	10.43	0.0	0.00735
1	3	102.33	4.81	107.14	2440.	2298.	47.2	21.0	466.7	111.2	282.1	5.59	-0.34	0.01	-0.02	10.45	0.0	0.00735
1	3	102.33	4.81	107.14	2440.	2298.	47.2	21.0	466.7	111.2	282.1	5.59	-0.34	0.01	-0.02	10.45	0.0	0.00735
1	3	102.39	4.80	107.20	2440.	2296.	47.3	21.0	475.5	112.9	281.4	5.58	-0.34	0.01	-0.02	10.48	0.0	0.00735
1	3	102.46	4.80	107.25	2441.	2294.	47.5	21.0	484.6	114.5	280.7	5.58	-0.35	0.01	-0.02	10.50	0.0	0.00735
1	3	102.52	4.79	107.31	2442.	2292.	47.7	21.0	493.8	116.1	280.0	5.58	-0.35	0.01	-0.02	10.52	0.0	0.00735
1	3	102.59	4.78	107.37	2443.	2290.	47.9	21.0	503.3	117.6	279.3	5.57	-0.36	0.01	-0.02	10.55	0.0	0.00735
1	3	102.59	4.78	107.37	2443.	2290.	47.9	21.0	503.3	117.6	279.3	5.57	-0.36	0.01	-0.02	10.55	0.0	0.00735
1	3	102.65	4.78	107.42	2443.	2288.	48.2	20.9	512.9	119.0	278.5	5.57	-0.37	0.01	-0.02	10.57	0.0	0.00735
1	3	102.71	4.77	107.48	2444.	2286.	48.5	20.9	522.7	120.4	277.8	5.57	-0.37	0.01	-0.02	10.60	0.0	0.00735
1	3	105.08	4.74	109.82	2427.	2277.	42.3	20.6	363.4	94.2	296.2	5.13	0.28	-0.01	0.05	9.83	0.0	0.00735
1	3	105.08	4.74	109.82	2427.	2277.	42.3	20.6	363.4	94.2	296.2	5.13	0.28	-0.01	0.05	9.83	0.0	0.00735
1	3	105.15	4.75	109.89	2422.	2279.	41.7	20.6	329.3	91.6	299.4	5.22	0.16	-0.01	0.05	9.73	0.0	0.00735
1	3	105.21	4.75	109.96	2416.	2280.	42.3	20.6	302.1	89.5	302.1	5.26	0.07	-0.01	0.06	9.65	0.0	0.00735
1	3	105.27	4.75	110.03	2411.	2282.	42.0	20.7	277.3	88.0	304.3	5.31	0.05	-0.01	0.08	9.57	0.0	0.00735
1	3	105.34	4.76	110.10	2406.	2284.	41.7	20.7	255.4	86.3	306.4	5.31	0.07	-0.01	0.09	9.51	0.0	0.00735
1	3	105.34	4.76	110.10	2406.	2284.	41.7	20.7	255.4	86.3	306.4	5.31	0.07	-0.01	0.09	9.51	0.0	0.00735
1	3	105.40	4.77	110.17	2401.	2287.	41.6	20.7	235.6	83.9	308.2	5.30	0.13	-0.02	0.09	9.46	0.0	0.00735
1	3	105.47	4.78	110.24	2396.	2289.	41.6	20.7	217.5	80.8	309.8	5.28	0.20	-0.01	0.10	9.41	0.0	0.00735
1	3	105.53	4.79	110.32	2391.	2292.	40.7	20.8	199.1	77.2	311.4	5.27	0.27	-0.01	0.09	9.35	0.0	0.00735
1	3	105.53	4.79	110.32	2391.	2292.	40.7	20.8	199.1	77.2	311.4	5.27	0.27	-0.01	0.09	9.35	0.0	0.00735
1	3	105.59	4.80	110.39	2387.	2294.	40.9	20.8	182.8	72.9	312.9	5.27	0.31	-0.00	0.09	9.31	0.0	0.00735
1	3	105.66	4.80	110.46	2382.	2297.	41.2	20.8	169.2	68.6	314.1	5.28	0.33	0.00	0.08	9.27	0.0	0.00735
1	3	105.72	4.82	110.54	2377.	2300.	40.6	20.9	155.3	64.5	315.3	5.31	0.33	0.01	0.07	9.22	0.0	0.00735
1	3	105.79	4.83	110.61	2373.	2303.	41.1	20.9	144.7	60.8	316.3	5.35	0.30	0.01	0.07	9.17	0.0	0.00735
1	3	105.79	4.83	110.61	2373.	2303.	41.1	20.9	144.7	60.8	316.3	5.35	0.30	0.01	0.07	9.17	0.0	0.00735
1	3	105.85	4.84	110.69	2368.	2306.	40.7	21.0	133.7	57.8	317.2	5.39	0.25	0.02	0.06	9.12	0.00000	0.00735

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LOCATION 6 GUN TYPE 3 ERROR MODE 3 POSITION=(15600.0, 10900.0, 90.0) RADIUS= 0.0 M

L N	DEM	FIRE TIME	FLT. TIME	INTCP TIME	FIRE RANGE	INTCP RANGE	SIG1	SIG2	BIAS1	BIAS2	CLOSE VEL.	AZIM. RATE	ELEV. RATE	MEAN AZ.ERR	MEAN EL.ERR	VULN AREA	SHOT PK	CUM.PK
1	3	105.91	4.85	110.76	2364.	2310.	41.4	21.0	125.8	55.2	317.9	5.43	0.21	0.02	0.06	9.08	0.00000	0.00735
1	3	105.98	4.86	110.83	2360.	2311.	41.4	21.1	118.5	53.4	317.9	5.47	0.17	0.02	0.06	9.05	0.00000	0.00735
1	3	106.04	4.86	110.90	2356.	2312.	40.5	21.1	111.8	52.3	316.8	5.49	0.15	0.02	0.07	9.01	0.00000	0.00735
1	3	106.04	4.86	110.90	2356.	2312.	40.5	21.1	111.8	52.3	316.8	5.49	0.15	0.02	0.07	9.01	0.00000	0.00735
1	3	106.11	4.86	110.97	2352.	2313.	40.9	21.1	107.4	51.1	315.9	5.52	0.14	0.02	0.07	8.98	0.00000	0.00736
1	3	106.17	4.86	111.03	2348.	2313.	41.3	21.1	103.6	49.9	314.9	5.53	0.15	0.03	0.07	8.95	0.00000	0.00736
1	3	106.23	4.87	111.10	2344.	2314.	40.7	21.1	98.4	48.7	313.7	5.54	0.16	0.03	0.07	8.92	0.00001	0.00737
1	3	106.23	4.87	111.10	2344.	2314.	40.7	21.1	98.4	48.7	313.7	5.54	0.16	0.03	0.07	8.92	0.00001	0.00737
1	3	106.30	4.87	111.17	2340.	2315.	41.2	21.1	95.4	47.2	312.7	5.55	0.18	0.03	0.07	8.89	0.00001	0.00738
1	3	106.36	4.87	111.23	2336.	2316.	41.9	21.1	92.7	45.6	311.6	5.56	0.19	0.03	0.07	8.86	0.00001	0.00739
1	3	106.43	4.88	111.30	2333.	2317.	41.4	21.1	88.7	44.1	310.3	5.57	0.20	0.03	0.07	8.82	0.00002	0.00741
1	3	106.49	4.89	111.37	2329.	2318.	41.1	21.1	85.1	42.6	309.0	5.59	0.20	0.04	0.06	8.78	0.00002	0.00744
1	3	106.49	4.89	111.37	2329.	2318.	41.1	21.1	85.1	42.6	309.0	5.59	0.20	0.04	0.06	8.78	0.00002	0.00746
1	3	106.55	4.89	111.44	2326.	2319.	42.0	21.1	83.7	41.1	307.8	5.61	0.19	0.04	0.06	8.74	0.00003	0.00749
1	3	106.62	4.89	111.51	2322.	2321.	41.8	21.2	81.0	39.9	306.4	5.63	0.18	0.04	0.06	8.70	0.00004	0.00753
1	3	106.68	4.90	111.58	2319.	2323.	41.6	21.2	78.8	39.0	305.0	5.65	0.16	0.05	0.06	8.65	0.00005	0.00758
1	3	106.68	4.90	111.58	2319.	2323.	41.6	21.2	78.8	39.0	305.0	5.65	0.16	0.05	0.06	8.65	0.00005	0.00763
1	3	106.75	4.91	111.65	2316.	2324.	41.6	21.2	77.0	38.2	303.5	5.68	0.15	0.05	0.06	8.62	0.00006	0.00769
1	3	106.81	4.91	111.72	2313.	2326.	42.8	21.2	77.4	37.5	302.2	5.70	0.13	0.05	0.06	8.60	0.00006	0.00775
1	3	106.87	4.91	111.79	2310.	2328.	43.0	21.2	76.4	37.0	300.6	5.72	0.12	0.05	0.06	8.56	0.00007	0.00781
1	3	106.94	4.92	111.86	2307.	2330.	43.2	21.3	75.7	36.6	299.0	5.73	0.12	0.05	0.06	8.53	0.00007	0.00789
1	3	106.94	4.92	111.86	2307.	2330.	43.2	21.3	75.7	36.6	299.0	5.73	0.12	0.05	0.06	8.53	0.00007	0.00796
1	3	107.00	4.94	111.94	2304.	2333.	42.3	21.3	73.5	36.3	297.3	5.75	0.11	0.05	0.06	8.49	0.00008	0.00804
1	3	107.07	4.94	112.01	2302.	2335.	42.7	21.3	73.3	35.8	295.7	5.76	0.11	0.05	0.06	8.45	0.00008	0.00812
1	3	107.13	4.95	112.08	2299.	2338.	43.2	21.4	73.4	35.4	294.1	5.77	0.11	0.05	0.05	8.41	0.00009	0.00821
1	3	107.13	4.95	112.08	2299.	2338.	43.2	21.4	73.4	35.4	294.1	5.77	0.11	0.05	0.05	8.41	0.00009	0.00829
1	3	107.19	4.96	112.15	2296.	2340.	43.9	21.7	73.7	34.9	292.4	5.78	0.11	0.06	0.05	8.37	0.00009	0.00839
1	3	107.26	4.97	112.23	2294.	2343.	43.8	21.9	72.9	34.6	290.6	5.80	0.11	0.06	0.05	8.33	0.00010	0.00848
1	3	107.32	4.98	112.30	2292.	2346.	44.6	22.1	73.6	34.1	288.9	5.81	0.11	0.06	0.05	8.29	0.00010	0.00859
1	3	107.39	4.99	112.38	2289.	2349.	44.4	22.2	73.1	33.9	287.1	5.82	0.10	0.06	0.05	8.24	0.00011	0.00869
1	3	107.39	4.99	112.38	2289.	2349.	44.4	22.2	73.1	33.9	287.1	5.82	0.10	0.06	0.05	8.24	0.00011	0.00880
1	3	107.45	5.01	112.46	2287.	2353.	44.5	22.3	73.1	33.7	285.3	5.84	0.09	0.06	0.05	8.19	0.00011	0.00891
1	3	107.51	5.02	112.53	2285.	2356.	44.8	22.3	73.6	33.6	283.4	5.85	0.08	0.06	0.05	8.14	0.00011	0.00902
1	3	107.58	5.03	112.61	2283.	2360.	45.4	22.4	74.6	33.5	281.6	5.86	0.07	0.06	0.04	8.09	0.00011	0.00912
1	3	107.64	5.05	112.69	2282.	2363.	45.2	22.5	74.4	33.6	279.6	5.87	0.07	0.06	0.04	8.03	0.00011	0.00923
1	3	107.64	5.05	112.69	2282.	2363.	45.2	22.5	74.4	33.6	279.6	5.87	0.07	0.06	0.04	8.03	0.00011	0.00933
1	3	107.71	5.05	112.76	2280.	2367.	46.4	22.5	76.4	33.5	277.8	5.88	0.06	0.06	0.04	7.99	0.00010	0.00944
1	3	107.77	5.08	112.85	2278.	2372.	45.7	22.6	75.7	33.7	275.7	5.89	0.05	0.06	0.04	7.92	0.00010	0.00954
1	3	107.83	5.09	112.92	2277.	2376.	46.3	22.7	77.0	33.8	273.8	5.90	0.05	0.07	0.04	7.86	0.00010	0.00964
1	3	107.83	5.09	112.92	2277.	2376.	46.3	22.7	77.0	33.8	273.8	5.90	0.05	0.07	0.04	7.86	0.00010	0.00973
1	3	107.90	5.10	113.00	2275.	2380.	47.3	22.8	78.9	33.9	271.8	5.91	0.04	0.07	0.04	7.81	0.00010	0.00983
1	3	107.96	5.12	113.08	2274.	2385.	47.5	22.9	79.6	34.1	269.8	5.92	0.04	0.07	0.04	7.74	0.00009	0.00992
1	3	108.03	5.14	113.16	2272.	2390.	48.1	23.0	80.9	34.2	267.8	5.93	0.03	0.07	0.04	7.68	0.00009	0.01001
1	3	108.09	5.16	113.25	2271.	2395.	47.9	23.1	81.3	34.5	265.6	5.94	0.03	0.07	0.04	7.61	0.00009	0.01009
1	3	108.09	5.16	113.25	2271.	2395.	47.9	23.1	81.3	34.5	265.6	5.94	0.03	0.07	0.04	7.61	0.00009	0.01017
1	3	108.15	5.18	113.33	2270.	2400.	48.1	23.2	82.2	34.7	263.5	5.94	0.02	0.07	0.03	7.54	0.00008	0.01026
1	3	108.22	5.19	113.41	2269.	2405.	49.7	23.3	85.1	34.9	261.5	5.95	0.01	0.07	0.03	7.48	0.00008	0.01033
1	3	108.28	5.22	113.50	2268.	2411.	49.6	23.4	85.7	35.2	259.3	5.96	0.01	0.07	0.03	7.40	0.00007	0.01041
1	3	108.28	5.22	113.50	2268.	2411.	49.6	23.4	85.7	35.2	259.3	5.96	0.01	0.07	0.03	7.40	0.00007	0.01048
1	3	108.35	5.24	113.58	2268.	2417.	49.9	23.5	86.9	35.6	257.1	5.96	-0.00	0.07	0.03	7.32	0.00007	0.01055
1	3	108.41	5.26	113.67	2267.	2423.	50.6	23.6	88.6	35.9	254.9	5.97	-0.01	0.07	0.03	7.25	0.00007	0.01061

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LOCATION 6 GUN TYPE 3 ERROR MODE 3 POSITION=(15600.0, 10900.0, 90.0) RADIUS= 0.0 M

L N	DEM	FIRE TIME	FLT. TIME	INTCP TIME	FIRE RANGE	INTCP RANGE	SIG1	SIG2	BIAS1	BIAS2	CLOSE VEL.	AZIM. RATE	ELEV. RATE	MEAN AZ.ERR	MEAN EL.ERR	VULN AREA	SHOT PK	CUM.PK
1	3	108.47	5.28	113.76	2266.	2429.	50.7	23.7	89.7	36.4	252.6	5.97	-0.01	0.07	0.03	7.16	0.00006	0.01067
1	3	108.54	5.31	113.85	2266.	2436.	51.2	23.9	91.3	36.8	250.4	5.98	-0.02	0.07	0.03	7.08	0.00006	0.01073
1	3	108.54	5.31	113.85	2266.	2436.	51.2	23.9	91.3	36.8	250.4	5.98	-0.02	0.07	0.03	7.08	0.00006	0.01079
1	3	108.60	5.34	113.94	2265.	2443.	51.2	24.0	92.2	37.3	248.0	5.98	-0.03	0.06	0.03	6.99	0.00005	0.01084
1	3	108.67	5.36	114.03	2265.	2450.	51.7	24.2	95.2	37.8	245.6	5.98	-0.03	0.06	0.02	6.91	0.00005	0.01089
1	3	108.73	5.39	114.12	2265.	2457.	52.6	24.3	97.6	38.3	243.3	5.99	-0.04	0.06	0.02	6.82	0.00004	0.01093
1	3	108.73	5.39	114.12	2265.	2457.	52.6	24.3	97.6	38.3	243.3	5.99	-0.04	0.06	0.02	6.82	0.00004	0.01097
1	3	108.79	5.41	114.20	2265.	2464.	54.1	24.4	100.6	38.7	241.0	5.99	-0.05	0.06	0.02	6.74	0.00004	0.01101
1	3	108.86	5.44	114.30	2265.	2472.	54.1	24.6	101.8	39.3	238.6	5.99	-0.05	0.06	0.02	6.64	0.00004	0.01105
1	3	108.92	5.47	114.40	2265.	2480.	54.6	24.7	103.8	39.8	236.2	5.99	-0.06	0.06	0.02	6.54	0.00003	0.01109
1	3	108.99	5.50	114.49	2265.	2488.	55.7	24.9	106.6	40.3	233.8	5.99	-0.06	0.06	0.02	6.45	0.00003	0.01112
1	3	108.99	5.50	114.49	2265.	2488.	55.7	24.9	106.6	40.3	233.8	5.99	-0.06	0.06	0.02	6.45	0.00003	0.01115
1	3	109.05	5.53	114.58	2265.	2496.	57.3	25.1	110.1	40.8	231.4	5.99	-0.07	0.06	0.02	6.36	0.00003	0.01118
1	3	109.11	5.57	114.68	2266.	2505.	57.7	25.2	112.1	41.4	228.9	5.99	-0.08	0.06	0.02	6.25	0.00003	0.01121

PK AS A FUNCTION OF ASPECT SECTOR AND IMPACT SPEED. LOC 6 GT 3 EM 3 X 15600. Y 10900. Z 90. RADIUS 0.M

SECTOR	AZIMUTH REAR=00	ELEV. DOWN=00	0-152	152-305	305-457	457-610	610-762	762-914	914-1067	1067-1219	TOTAL PK
1	000-045	000-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	045-090	000-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	090-135	000-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	135-180	000-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	180-225	000-045	0.0	0.0003255	0.0012023	0.0	0.0	0.0	0.0	0.0	0.0015274
6	225-270	000-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	270-315	000-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	315-360	000-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	000-045	045-090	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	045-090	045-090	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	090-135	045-090	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	135-180	045-090	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	180-225	045-090	0.0	0.0	0.0058241	0.0	0.0	0.0	0.0	0.0	0.0058241
14	225-270	045-090	0.0	0.0036015	0.0002850	0.0	0.0	0.0	0.0	0.0	0.0038855
15	270-315	045-090	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16	315-360	045-090	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17	000-045	090-135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18	045-090	090-135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19	090-135	090-135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20	135-180	090-135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21	180-225	090-135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22	225-270	090-135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23	270-315	090-135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24	315-360	090-135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25	000-045	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26	045-090	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27	090-135	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
28	135-180	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29	180-225	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30	225-270	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
31	270-315	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

PK AS A FUNCTION OF ASPECT SECTOR AND IMPACT SPEED. LOC 6 GT 3 EM 3 X 15600. Y 10500. Z 90. RADIUS 0.M

SECTOR	AZIMUTH REAR=00	ELEV. DOWN=00	0-152	152-305	305-457	457-610	610-762	762-914	914-1067	1067-1219	TOTAL PK
32	315-360	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		TOTALS	0.0	0.0039258	0.0073024	0.0	0.0	0.0	0.0	0.0	0.0111996

MULTIPATH INPUTS (INITIAL OR CHANGED

IRMP = 2
REFC = 0.350

ECM INPUTS (INITIAL OR CHANGED)

IP = 5
IJ = 0
GAINJ(DB) = 1.00
PJ(W) = 500.00
PLEN(S) = 0.0
IX = 1
XSEC(SQM) = 0.0
CALX = 1.000
IRECM = 3
SJTMAX(DB) = 17.00

JAMMER ANTENNA GAIN 1.000 DB

AIRCRAFT CROSS SECTION TABLE SPECIFIED. PRINTED VALUES WILL BE MULTIPLIED BY CALX. CALX= 1.00

```
TABLE DATA
  19 ELEMENTS FROM        0.0  TO      180.00 BY       10.00  AZ
   7 ELEMENTS FROM      -90.00 TO       90.00 BY       30.00  EL
ELSEWHERE TABLE IS     1000.00
```

BCS MATRIX

ELEV	0	10	20	30	40	50	60	70	80	90	100	110	120
-120.0	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00
-90.0	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00
-60.0	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
-30.0	0.27	0.18	0.05	0.02	0.16	0.17	0.06	0.17	0.23	0.05	0.02	0.01	0.01
0.0	0.00	0.00	0.01	0.01	0.09	0.09	0.04	0.07	0.11	0.03	0.02	0.01	0.01
30.0	0.27	0.18	0.05	0.02	0.16	0.17	0.06	0.17	0.23	0.05	0.02	0.01	0.01
60.0	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
90.0	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00
120.0	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00

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RCS MATRIX

ELEV	130	140	150	160	170	180
-120.0	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00
-90.0	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00
-60.0	100.00	100.00	100.00	100.00	100.00	100.00
-30.0	0.07	0.07	0.02	0.03	0.11	0.45
0.0	0.03	0.03	0.02	0.03	0.10	0.51
30.0	0.07	0.07	0.02	0.03	0.11	0.45
60.0	100.00	100.00	100.00	100.00	100.00	100.00
90.0	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00
120.0	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00

VULNERABLE AREA (SQ. METERS) AS A FUNCTION OF IMPACT SPEED (METERS/SEC) AND ASPECT VIEW
VULNERABLE AREA TABLE VS TYPE 5 WEAPON

VIEW	0	152	305	457	610	762	914	1067	1219
1	0.00	55.37	55.37	55.37	55.37	55.37	55.37	55.37	55.37
2	0.00	43.22	43.22	43.22	43.22	43.22	43.22	43.22	43.22
3	0.00	47.10	47.10	47.10	47.10	47.10	47.10	47.10	47.10
4	0.00	62.53	62.53	62.53	62.53	62.53	62.53	62.53	62.53
5	0.00	47.10	47.10	47.10	47.10	47.10	47.10	47.10	47.10
6	0.00	43.22	43.22	43.22	43.22	43.22	43.22	43.22	43.22
7	0.00	47.10	47.10	47.10	47.10	47.10	47.10	47.10	47.10
8	0.00	62.53	62.53	62.53	62.53	62.53	62.53	62.53	62.53
9	0.00	47.10	47.10	47.10	47.10	47.10	47.10	47.10	47.10
10	0.00	5.76	5.76	5.76	5.76	5.76	5.76	5.76	5.76
11	0.00	27.45	27.45	27.45	27.45	27.45	27.45	27.45	27.45
12	0.00	33.07	33.07	33.07	33.07	33.07	33.07	33.07	33.07
13	0.00	27.45	27.45	27.45	27.45	27.45	27.45	27.45	27.45
14	0.00	5.76	5.76	5.76	5.76	5.76	5.76	5.76	5.76
15	0.00	27.45	27.45	27.45	27.45	27.45	27.45	27.45	27.45
16	0.00	33.07	33.07	33.07	33.07	33.07	33.07	33.07	33.07
17	0.00	27.45	27.45	27.45	27.45	27.45	27.45	27.45	27.45
18	0.00	5.76	5.76	5.76	5.76	5.76	5.76	5.76	5.76
19	0.00	47.10	47.10	47.10	47.10	47.10	47.10	47.10	47.10
20	0.00	62.53	62.53	62.53	62.53	62.53	62.53	62.53	62.53
21	0.00	47.10	47.10	47.10	47.10	47.10	47.10	47.10	47.10
22	0.00	43.22	43.22	43.22	43.22	43.22	43.22	43.22	43.22
23	0.00	47.10	47.10	47.10	47.10	47.10	47.10	47.10	47.10
24	0.00	62.53	62.53	62.53	62.53	62.53	62.53	62.53	62.53
25	0.00	47.10	47.10	47.10	47.10	47.10	47.10	47.10	47.10
26	0.00	55.37	55.37	55.37	55.37	55.37	55.37	55.37	55.37

AFATL P-001 AAASIM * AIRCRAFT-COMBAT-SURVIVABILITY SCENARIO *

LOCATION 7 GUN TYPE 5 ERROR MODE 3 POSITION=(12800.0, 7500.0, 20.0) RADIUS= 0.0 M

L N	DEM	FIRE TIME	FLT. TIME	INTCP TIME	FIRE RANGE	INTCP RANGE	SIG1	SIG2	BIAS1	BIAS2	CLOSE VEL.	AZIM. RATE	ELEV. RATE	MEAN AZ.ERR	MEAN EL.ERR	VULN AREA	SHOT PK	CUM.PK
1	3	39.49	11.44	50.93	7912.	5561.	55.3	50.0	635.3	524.9	416.5	1.31	0.09	-0.01	0.00	35.88	0.0	0.0
1	3	39.87	11.29	51.16	7859.	5915.	59.3	50.2	612.4	582.6	418.7	1.32	0.09	-0.01	-0.00	36.27	0.0	0.0
1	3	40.32	11.11	51.43	7797.	5862.	59.3	50.4	580.4	650.5	421.7	1.35	0.09	-0.01	-0.00	36.69	0.0	0.0
1	3	40.77	10.94	51.70	7736.	5809.	53.8	50.6	533.9	724.3	425.3	1.37	0.09	-0.01	-0.00	37.07	0.0	0.0
1	3	41.15	10.79	51.94	7685.	5763.	60.0	50.8	493.0	781.8	428.8	1.39	0.09	-0.00	-0.00	37.37	0.0	0.0
1	3	41.60	10.63	52.23	7614.	5712.	55.8	50.8	439.9	825.4	433.1	1.27	0.10	-0.06	0.00	37.63	0.0	0.0
1	3	42.05	10.56	52.60	7537.	5690.	58.4	50.1	335.8	708.3	435.3	1.15	0.12	-0.03	0.00	37.31	0.0	0.0
1	3	42.43	10.50	52.93	7472.	5672.	57.3	49.5	307.7	698.0	436.6	1.23	0.11	-0.04	0.00	36.85	0.0	0.0
1	3	42.88	10.44	53.32	7396.	5652.	56.0	48.8	272.9	683.1	438.4	1.22	0.12	-0.03	0.00	36.30	0.0	0.0
1	3	43.33	10.38	53.71	7322.	5633.	54.7	48.0	276.7	704.9	440.1	1.25	0.12	-0.03	0.00	35.69	0.0	0.0
1	3	43.71	10.33	54.04	7258.	5618.	54.2	47.5	269.7	736.6	441.8	1.27	0.12	-0.03	0.00	35.16	0.0	0.0
1	3	44.16	10.28	54.44	7185.	5601.	53.3	46.8	295.6	782.0	443.6	1.30	0.12	-0.02	0.00	34.52	0.0	0.0
1	3	44.61	10.23	54.84	7112.	5585.	52.9	46.1	316.9	838.5	445.7	1.33	0.12	-0.02	0.00	33.86	0.0	0.0
1	3	45.05	10.19	55.24	7040.	5571.	52.2	45.4	365.3	895.0	447.7	1.36	0.13	-0.02	0.01	33.19	0.0	0.0
1	3	45.44	10.15	55.59	6979.	5559.	51.9	44.9	397.9	951.5	449.6	1.38	0.13	-0.01	0.01	32.62	0.0	0.0
1	3	45.89	10.12	56.00	6909.	5547.	51.4	44.2	459.7	1012.5	451.8	1.41	0.13	-0.01	0.01	31.93	0.0	0.0
1	3	46.33	10.08	56.42	6840.	5536.	51.2	43.7	509.7	1082.3	454.2	1.44	0.13	-0.01	0.01	31.25	0.0	0.0
1	3	46.72	10.05	56.77	6781.	5528.	51.3	43.4	546.8	1147.4	456.4	1.46	0.13	-0.00	0.01	30.66	0.0	0.0
1	3	47.17	10.03	57.20	6712.	5519.	51.0	42.8	618.7	1213.1	458.9	1.49	0.13	-0.01	0.01	29.56	0.0	0.0
1	3	47.61	10.01	57.62	6624.	5512.	50.9	43.7	497.1	1275.0	463.2	0.80	0.21	-0.13	-0.02	27.20	0.0	0.0
1	1	48.00	9.99	57.99	6546.	5508.	1691.4	1661.0	882.7	985.4	463.6	0.94	0.05	-0.04	-0.01	29.62	0.00000	0.00000
1	1	48.45	9.98	58.43	6455.	5503.	1586.6	1560.0	790.3	860.6	467.3	0.91	0.33	-0.06	-0.03	29.43	0.00000	0.00000
1	1	48.89	9.97	58.87	6365.	5501.	1513.1	1490.4	690.1	734.2	471.7	1.00	0.14	-0.02	-0.06	29.15	0.00000	0.00000
1	1	49.34	9.97	59.31	6275.	5500.	1468.6	1449.5	590.1	604.4	476.7	0.98	0.23	-0.01	-0.10	28.79	0.00000	0.00001
1	1	49.73	9.89	59.61	6198.	5473.	1443.9	1427.3	491.0	442.0	479.6	1.03	0.20	0.01	-0.12	29.39	0.00000	0.00001
1	1	50.17	9.77	59.94	6109.	5432.	1432.5	1417.5	370.5	237.5	482.3	1.05	0.22	0.03	-0.15	30.40	0.00000	0.00001
1	1	50.62	9.65	60.27	6021.	5392.	1437.9	1423.3	248.1	38.9	485.2	1.09	0.22	0.06	-0.19	31.36	0.00000	0.00001
1	1	51.01	9.54	60.55	5945.	5358.	1451.8	1437.1	141.2	126.8	487.5	1.11	0.23	0.08	-0.22	32.14	0.00000	0.00002
1	3	51.45	9.43	60.88	5858.	5317.	46.7	43.5	223.7	1563.0	498.4	1.27	0.38	0.08	-0.28	27.42	0.0	0.00002
1	3	51.90	9.31	61.22	5771.	5278.	46.4	43.9	486.9	1532.5	501.0	1.13	0.17	0.11	-0.31	27.92	0.0	0.00002
1	3	52.29	9.22	61.50	5708.	5244.	54.2	45.2	1527.6	555.3	503.0	1.26	0.26	0.06	-0.18	28.43	0.0	0.00002
1	3	52.73	9.11	61.84	5683.	5205.	54.1	44.6	1080.0	377.2	505.4	0.15	2.92	-0.03	0.04	30.03	0.0	0.00002
1	3	53.18	8.99	62.18	5659.	5166.	52.5	44.2	552.0	218.3	507.0	0.73	1.55	-0.01	0.01	31.72	0.0	0.00002
1	3	53.57	8.90	62.47	5640.	5133.	51.4	43.7	256.4	105.2	508.2	0.43	2.30	-0.03	0.04	32.81	0.0	0.00002
1	3	54.01	8.80	62.81	5619.	5096.	50.3	43.4	7.7	11.0	509.7	0.60	1.93	-0.03	0.04	33.86	0.00236	0.00237
1	3	54.46	8.69	63.16	5600.	5059.	49.3	43.1	196.0	110.1	511.3	0.52	2.15	-0.03	0.05	34.65	0.0	0.00237
1	1	54.91	8.59	63.50	5583.	5021.	1113.2	1098.4	35.7	300.0	512.7	0.75	2.36	-0.08	0.02	35.31	0.00000	0.00238
1	1	55.29	8.51	63.80	5569.	4989.	1071.1	1055.9	17.4	268.8	515.1	0.46	1.96	-0.08	0.04	35.48	0.00000	0.00238
1	1	55.74	8.41	64.15	5555.	4953.	1026.6	1011.0	4.3	236.1	517.8	0.62	2.18	-0.05	0.05	35.69	0.00001	0.00239
1	1	56.19	8.31	64.50	5542.	4917.	987.0	970.8	24.5	205.3	520.4	0.56	2.09	-0.09	0.07	35.88	0.00001	0.00239
1	1	56.57	8.23	64.81	5532.	4886.	956.5	940.0	41.4	181.3	522.6	0.60	2.15	-0.10	0.08	36.04	0.00001	0.00240
1	1	57.02	8.12	65.14	5523.	4845.	924.9	907.0	67.6	159.3	525.8	0.59	2.13	-0.11	0.10	36.13	0.00001	0.00240
1	1	57.47	7.99	65.46	5515.	4795.	896.1	876.9	101.8	144.6	530.1	0.60	2.15	-0.12	0.11	36.12	0.00001	0.00241
1	1	57.85	7.88	65.73	5509.	4753.	875.2	854.5	130.2	133.1	533.7	0.61	2.15	-0.13	0.12	36.10	0.00001	0.00242
1	1	58.30	7.75	66.05	5504.	4703.	855.0	832.3	162.3	121.1	538.1	0.62	2.16	-0.14	0.14	36.07	0.00001	0.00243
1	1	58.75	7.63	66.38	5501.	4654.	839.2	814.0	192.9	110.2	542.5	0.62	2.16	-0.15	0.15	36.02	0.00001	0.00244
1	1	59.20	7.50	66.70	5500.	4604.	827.7	799.6	222.5	100.4	547.0	0.63	2.16	-0.15	0.16	35.97	0.00001	0.00244
1	1	59.58	7.40	66.98	5477.	4562.	812.5	781.0	235.1	107.6	551.0	0.64	2.04	-0.04	-0.03	35.88	0.00001	0.00245
1	1	60.03	7.28	67.31	5421.	4513.	785.1	749.9	256.8	83.7	556.0	1.71	0.46	-0.04	0.01	35.73	0.00001	0.00246
1	1	60.48	7.17	67.64	5366.	4464.	758.6	720.2	271.2	66.0	561.0	1.29	1.20	-0.03	-0.03	35.54	0.00001	0.00247
1	1	60.86	7.06	67.92	5320.	4423.	737.0	696.1	284.5	45.5	565.5	1.53	0.87	-0.04	0.01	35.37	0.00001	0.00248

LOCATION 7 GUN TYPE 5 ERROR MODE 3 POSITION=(12800.0, 7500.0, 20.0) RADIUS= 0.0 M

L N	DEM	FIRE TIME	FLT. TIME	INTCP TIME	FIRE RANGE	INTCP RANGE	SIG1	SIG2	BIAS1	BIAS2	CLOSE VEL.	AZIM. RATE	ELEV. RATE	MEAN AZ.ERR	MEAN EL.ERR	VULN AREA	SHOT PK	CUM.PK
1	1	61.31	6.95	68.26	5267.	4375.	712.1	669.3	298.9	26.3	570.6	1.47	1.07	-0.04	-0.00	35.17	0.00001	0.00249
1	1	61.76	6.84	68.59	5215.	4327.	688.1	643.9	312.8	5.7	575.8	1.55	1.01	-0.05	0.01	34.95	0.00001	0.00250
1	1	62.14	6.74	68.88	5170.	4286.	668.4	623.3	324.4	10.2	580.3	1.57	1.06	-0.05	0.01	34.77	0.00001	0.00251
1	3	62.59	6.63	69.22	5120.	4239.	37.6	33.6	153.5	146.6	589.6	1.60	1.06	0.02	0.05	33.78	0.0	0.00251
1	3	63.04	6.52	69.56	5071.	4192.	37.4	33.1	196.5	133.1	594.2	1.64	1.06	-0.01	0.04	33.79	0.0	0.00251
1	3	63.42	6.43	69.85	5029.	4152.	37.1	32.7	204.7	120.0	598.9	1.69	1.08	-0.00	0.06	33.59	0.0	0.00251
1	3	63.87	6.33	70.20	4982.	4106.	36.9	32.3	226.9	113.5	604.0	1.74	1.09	-0.01	0.06	33.47	0.0	0.00251
1	3	64.32	6.22	70.54	4936.	4060.	36.5	31.8	241.3	108.1	609.4	1.79	1.11	-0.01	0.07	33.28	0.0	0.00251
1	3	64.76	6.13	70.89	4891.	4014.	36.1	31.4	256.2	105.7	614.7	1.83	1.11	-0.01	0.07	33.11	0.0	0.00251
1	3	65.15	6.04	71.19	4844.	3976.	35.9	30.9	266.5	103.9	619.4	1.85	1.11	-0.07	0.04	32.94	0.0	0.00251
1	3	65.60	5.93	71.53	4774.	3927.	35.4	30.5	193.2	76.5	627.2	1.29	0.75	-0.08	0.04	32.23	0.0	0.00251
1	3	66.04	5.81	71.86	4705.	3870.	34.9	30.0	143.5	68.7	634.1	1.60	0.96	-0.07	0.05	31.99	0.00000	0.00251
1	3	66.43	5.71	72.14	4646.	3822.	34.5	29.6	117.9	63.6	639.6	1.54	0.88	-0.07	0.06	31.91	0.00000	0.00252
1	3	66.86	5.59	72.47	4578.	3766.	34.0	29.1	100.2	66.1	645.5	1.65	0.95	-0.06	0.06	31.92	0.00001	0.00252
1	3	67.32	5.48	72.80	4511.	3710.	33.5	28.6	92.4	70.4	651.3	1.69	0.95	-0.05	0.07	32.03	0.00001	0.00253
1	3	67.71	5.38	73.09	4455.	3662.	33.1	28.2	91.0	77.3	656.2	1.75	0.98	-0.05	0.07	32.17	0.00000	0.00253
1	3	68.16	5.26	73.42	4365.	3607.	32.6	27.7	93.1	86.0	661.8	1.82	0.99	-0.04	0.08	32.37	0.00000	0.00253
1	3	68.60	5.15	73.76	4325.	3551.	32.2	27.1	98.1	96.2	667.2	1.89	1.01	-0.03	0.09	32.61	0.00000	0.00253
1	3	69.05	5.04	74.10	4262.	3497.	31.7	26.6	105.3	106.6	672.7	1.97	1.03	-0.03	0.10	32.87	0.0	0.00253
1	3	69.44	4.95	74.39	4209.	3449.	31.3	26.2	112.1	115.8	677.2	2.03	1.04	-0.02	0.10	33.11	0.0	0.00253
1	3	69.88	4.85	74.73	4147.	3395.	30.9	25.7	121.4	126.3	682.6	2.11	1.06	-0.01	0.11	33.41	0.0	0.00253
1	3	70.33	4.74	75.08	4087.	3341.	30.4	25.3	130.7	136.6	687.7	2.20	1.07	-0.00	0.11	33.72	0.0	0.00253
1	3	70.72	4.66	75.37	4037.	3295.	30.0	24.8	139.3	145.1	692.2	2.27	1.09	0.00	0.12	34.00	0.0	0.00253
1	3	71.16	4.55	75.72	3979.	3242.	29.7	24.4	149.6	154.6	697.4	2.37	1.10	0.01	0.13	34.34	0.0	0.00253
1	3	71.61	4.46	76.07	3912.	3190.	29.2	24.0	157.6	161.4	702.5	2.40	1.00	-0.06	0.01	34.67	0.0	0.00253
1	3	72.00	4.37	76.37	3846.	3145.	28.9	23.6	113.3	111.5	708.8	1.94	0.20	-0.06	0.04	34.42	0.0	0.00253
1	3	72.44	4.28	76.72	3770.	3094.	28.5	23.2	75.0	80.4	715.4	2.25	0.63	-0.05	0.03	34.29	0.00000	0.00253
1	3	72.89	4.19	77.08	3695.	3043.	28.0	22.7	50.4	51.2	721.4	2.28	0.44	-0.04	0.05	34.32	0.00014	0.00267
1	3	73.28	4.11	77.38	3631.	3000.	27.8	22.4	35.9	37.9	726.5	2.40	0.54	-0.04	0.05	34.44	0.00092	0.00359
1	3	73.72	4.02	77.75	3557.	2950.	27.4	22.0	23.9	23.6	732.0	2.50	0.49	-0.03	0.06	34.64	0.00353	0.00710
1	3	74.17	3.94	78.11	3484.	2901.	27.0	21.6	15.9	15.1	737.1	2.62	0.50	-0.03	0.06	34.90	0.00625	0.01331
1	3	74.62	3.82	78.44	3413.	2836.	26.5	21.0	33.0	11.7	743.0	2.75	0.49	-0.02	0.07	35.23	0.00396	0.01722
1	3	75.00	3.73	78.73	3352.	2780.	26.1	20.5	48.9	10.4	748.0	2.86	0.49	-0.01	0.08	35.40	0.00160	0.01879
1	3	75.45	3.62	79.07	3283.	2716.	25.6	20.0	68.1	9.2	753.7	3.00	0.47	-0.01	0.08	35.46	0.00030	0.01908
1	3	75.90	3.51	79.41	3215.	2651.	25.2	19.6	87.7	8.4	759.3	3.15	0.46	0.00	0.09	35.40	0.00003	0.01911
1	3	76.28	3.42	79.70	3158.	2596.	24.7	19.3	104.2	7.4	764.0	3.27	0.44	0.01	0.10	35.23	0.00000	0.01911
1	3	76.73	3.31	80.04	3092.	2532.	24.3	18.9	123.1	6.0	769.3	3.43	0.42	0.01	0.10	34.93	0.0	0.01911
1	3	77.18	3.21	80.39	3025.	2469.	23.8	18.6	141.5	4.2	774.5	3.60	0.39	0.02	0.11	34.52	0.0	0.01911
1	3	77.56	3.12	80.68	2975.	2414.	23.4	18.3	156.5	2.2	778.7	3.74	0.36	0.03	0.11	34.09	0.0	0.01911
1	3	78.01	3.02	81.03	2915.	2351.	22.9	18.0	173.0	0.5	783.6	3.91	0.33	0.03	0.12	33.50	0.0	0.01911
1	3	78.46	2.92	81.38	2833.	2290.	22.5	16.6	173.7	1.8	789.3	3.12	0.19	-0.26	0.07	32.68	0.0	0.01911
1	3	78.91	2.83	81.74	2746.	2228.	22.1	16.1	105.4	0.9	799.1	2.79	0.13	-0.15	0.08	31.07	0.00000	0.01911
1	3	79.29	2.75	82.04	2673.	2176.	21.9	15.7	81.0	0.8	805.4	3.19	0.12	-0.18	0.05	29.99	0.00002	0.01912
1	3	79.74	2.66	82.40	2589.	2116.	21.6	15.3	55.2	1.0	812.3	3.26	0.08	-0.16	0.04	28.65	0.00053	0.01964
1	3	80.19	2.57	82.76	2505.	2057.	21.2	15.0	39.1	2.3	818.4	3.54	0.03	-0.16	0.02	27.30	0.00247	0.02207
1	3	80.57	2.50	83.07	2435.	2007.	20.9	14.6	29.2	2.9	823.1	3.73	-0.00	-0.15	0.01	26.55	0.00515	0.02711
1	3	81.02	2.41	83.43	2354.	1950.	20.7	14.3	21.6	3.9	828.2	3.99	-0.06	-0.15	-0.01	29.08	0.00867	0.03554
1	3	81.47	2.33	83.80	2275.	1894.	20.4	13.9	16.1	4.8	832.4	4.27	-0.13	-0.14	-0.03	31.18	0.01195	0.04707
1	3	81.85	2.26	84.11	2208.	1848.	20.2	13.5	13.2	5.5	835.7	4.53	-0.20	-0.14	-0.05	32.95	0.01408	0.06049
1	1	82.30	2.19	84.49	2132.	1796.	92.2	44.4	133.8	16.6	827.3	5.80	-0.34	-0.37	-0.07	36.03	0.00046	0.06091
1	1	82.75	2.12	84.86	2058.	1745.	87.2	45.3	125.8	27.7	829.8	4.89	-0.40	-0.34	-0.10	38.12	0.00045	0.06134

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LOCATION 7 GUN TYPE 5 ERROR MODE 3 POSITION=(12800.0, 7500.0, 20.0) RADIUS= 0.0 M

L N	OEM	FIRE TIME	FLT. TIME	INTCP TIME	FIRE RANGE	INTCP RANGE	SIG1	SIG2	BIAS1	BIAS2	CLOSE VEL.	AZIM. RATE	ELEV. RATE	MEAN AZ.ERR	MEAN EL.ERR	VULN AREA	SHOT PK	CUM.PK
1	1	83.13	2.06	85.19	1997.	1704.	85.0	46.1	121.0	36.1	830.9	5.66	-0.54	-0.36	-0.12	39.94	0.00043	0.06174
1	1	83.58	2.04	85.62	1927.	1692.	86.0	48.2	107.2	60.5	819.3	5.82	-0.68	-0.38	-0.16	41.95	0.00034	0.06206
1	1	84.03	2.09	86.12	1861.	1729.	89.2	51.7	88.2	106.4	790.9	6.27	-0.88	-0.40	-0.20	43.68	0.00011	0.06216
1	1	84.47	2.16	86.63	1797.	1774.	92.5	55.3	77.5	157.5	760.0	6.61	-1.09	-0.42	-0.23	44.95	0.00002	0.06218
1	1	84.86	2.22	87.08	1746.	1819.	95.5	58.7	76.5	204.5	732.1	6.94	-1.30	-0.44	-0.27	45.59	0.00000	0.06218
1	1	85.31	2.31	87.61	1689.	1879.	98.9	62.8	85.0	263.8	697.0	7.30	-1.58	-0.46	-0.31	45.67	0.00000	0.06218
1	3	85.75	2.40	88.16	1701.	1946.	25.6	18.7	52.5	182.3	671.0	8.03	-3.47	0.05	-0.67	47.25	0.0	0.06218
1	3	86.14	2.50	88.64	1731.	2010.	25.3	19.1	11.0	108.1	632.8	7.56	-3.91	-0.22	-0.40	47.23	0.0	0.06218
1	3	86.59	2.62	89.21	1770.	2091.	25.0	19.4	4.1	82.8	592.7	6.73	-3.66	-0.16	-0.46	43.35	0.00000	0.06218
1	3	87.03	2.75	89.79	1814.	2179.	25.0	19.8	7.7	51.7	551.7	6.26	-3.59	-0.22	-0.35	39.58	0.00041	0.06257
1	3	87.42	2.88	90.30	1856.	2260.	25.0	20.1	8.9	41.0	517.4	5.79	-3.55	-0.21	-0.34	36.40	0.00138	0.06387
1	3	87.87	3.04	90.90	1909.	2361.	25.1	20.6	10.4	28.3	477.1	5.34	-3.42	-0.21	-0.29	32.95	0.00363	0.06726
1	1	88.31	3.23	91.54	1967.	2483.	102.6	84.1	148.7	209.5	442.7	4.59	-3.39	-0.16	-0.25	29.86	0.00001	0.06727
1	1	88.76	3.47	92.23	2027.	2627.	109.9	87.5	178.9	170.8	417.0	4.63	-3.14	-0.11	-0.21	31.75	0.00002	0.06729
1	1	89.15	3.68	92.83	2082.	2754.	118.6	90.4	206.6	136.9	395.6	4.13	-3.06	-0.09	-0.18	32.42	0.00003	0.06732
1	1	89.59	3.94	93.54	2149.	2906.	132.2	93.8	238.1	96.9	371.6	3.89	-2.88	-0.06	-0.16	32.81	0.00005	0.06737
1	1	90.04	4.23	94.27	2219.	3064.	150.4	97.4	267.5	58.8	348.0	3.55	-2.73	-0.02	-0.14	33.03	0.00006	0.06742
1	1	90.43	4.48	94.91	2261.	3203.	164.0	100.9	289.6	28.1	328.5	3.34	-2.59	0.00	-0.13	32.97	0.00006	0.06748
1	1	90.87	4.80	95.68	2356.	3372.	173.3	105.4	309.7	2.9	306.0	3.09	-2.45	0.04	-0.12	32.47	0.00006	0.06754
1	1	91.32	5.14	96.47	2437.	3546.	181.2	110.9	327.5	32.7	284.2	3.14	-2.25	-0.04	-0.01	31.24	0.00005	0.06758
1	1	91.71	5.45	97.16	2517.	3700.	185.5	115.2	340.6	43.3	266.0	1.56	-0.87	-0.16	0.06	29.55	0.00004	0.06762
1	1	92.15	5.63	97.99	2611.	3881.	190.5	121.2	336.4	49.7	246.5	2.06	-1.45	-0.08	0.02	28.09	0.00004	0.06765
1	1	92.60	6.21	98.81	2706.	4051.	195.2	127.9	302.7	56.2	231.3	1.56	-1.01	-0.09	0.03	28.86	0.00005	0.06770
1	1	92.99	6.55	99.53	2788.	4203.	200.0	134.7	270.5	61.9	218.6	1.65	-1.14	-0.07	0.03	30.31	0.00006	0.06776
1	1	93.43	6.98	100.42	2884.	4390.	206.9	144.2	230.0	68.6	203.8	1.44	-0.97	-0.07	0.03	32.52	0.00008	0.06784
1	1	93.88	7.47	101.35	2980.	4588.	215.9	155.6	165.3	76.1	189.2	1.39	-0.56	-0.06	0.03	35.36	0.00010	0.06793
1	1	94.33	8.01	102.34	3077.	4802.	234.0	169.4	135.8	84.1	174.8	1.28	-0.88	-0.05	0.03	38.97	0.00012	0.06804
1	1	94.71	8.54	103.26	3161.	5001.	253.3	183.5	88.5	91.9	162.9	1.22	-0.85	-0.04	0.03	42.82	0.00012	0.06815
1	1	95.16	9.20	104.36	3259.	5237.	280.2	203.0	23.7	104.6	152.0	1.14	-0.79	-0.03	0.03	45.39	0.00011	0.06826
1	1	95.61	9.46	105.07	3357.	5327.	305.4	221.1	85.5	140.1	160.4	1.07	-0.75	-0.02	0.03	47.37	0.00009	0.06834
1	1	95.99	9.70	105.69	3442.	5409.	336.2	243.2	180.4	170.6	168.3	1.02	-0.71	-0.02	0.03	48.61	0.00006	0.06840
1	1	96.44	10.00	106.44	3541.	5511.	407.1	294.4	288.0	208.5	177.9	0.96	-0.68	-0.01	0.03	51.06	0.00004	0.06844

PK AS A FUNCTION OF ASPECT SECTOR AND IMPACT SPEED. LOC 7 GT 5 EM 3 X 12800. Y 7500. Z 20. RADIUS 0.M

SECTOR	AZIMUTH REAR=00	ELEV. DOWN=00	0-152	152-305	305-457	457-610	610-762	762-914	914-1067	1067-1219	TOTAL PK
1	000-045	000-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	045-090	000-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	090-135	000-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	135-180	000-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	180-225	000-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	225-270	000-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	270-315	000-045	0.0	0.0000411	0.0	0.0	0.0	0.0	0.0	0.0	0.0000411
8	315-360	000-045	0.0001108	0.0001518	0.0	0.0	0.0	0.0	0.0	0.0	0.0002626
9	000-045	045-090	0.0	0.0000374	0.0	0.0	0.0	0.0	0.0	0.0	0.0000374
10	045-090	045-090	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	090-135	045-090	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	135-180	045-090	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	180-225	045-090	0.0	0.0	0.0	0.0025140	0.0166329	0.0030211	0.0	0.0	0.0220685

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PK AS A FUNCTION OF ASPECT SECTOR AND IMPACT SPEED. LOC 7 GT 5 EM 3 X 12800. Y 7500. Z 20. RADIUS 0.M

SECTOR	AZIMUTH REAR=00	ELEV. DOWN=00	0-152	152-305	305-457	457-610	610-762	762-914	914-1067	1067-1219	TOTAL PK
14	225-270	045-090	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15	270-315	045-090	0.0	0.0	0.0000294	0.0	0.0	0.0	0.0	0.0	0.0000294
16	315-360	045-090	0.0	0.0006235	0.0002650	0.0	0.0	0.0	0.0	0.0	0.0008884
17	000-045	090-135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18	045-090	090-135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19	090-135	090-135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20	135-180	090-135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21	180-225	090-135	0.0	0.0	0.0	0.0	0.0	0.0392846	0.0	0.0	0.0392846
22	225-270	090-135	0.0	0.0	0.0	0.0	0.0000196	0.0017850	0.0	0.0	0.0018045
23	270-315	090-135	0.0	0.0	0.0	0.0054171	0.0	0.0	0.0	0.0	0.0054171
24	315-360	090-135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25	000-045	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26	045-090	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27	090-135	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
28	135-180	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29	180-225	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30	225-270	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
31	270-315	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
32	315-360	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		TOTALS	0.0001108	0.0008536	0.0002945	0.0079175	0.0166521	0.0438968	0.0	0.0	0.0684357

LOC	P(KILL)	ROUNDS	FIRE TIME	XGUN	YGUN	ZGUN	RADIUS	GL	T REACT	T TRACK	GT	EM	CB	SB	LOC
1	0.0	0	0.0	14800.00	5000.00	40.00	0.0	1	0.0	2.50	1	1	1	1	1
2	0.0010946	7	5.25	16200.00	8200.00	40.00	0.0	1	0.0	2.50	1	1	1	1	2
3	0.0003691	17	6.80	13600.00	7200.00	20.00	0.0	1	0.0	2.50	2	1	1	1	3
4	0.0	0	0.0	13400.00	8000.00	20.00	0.0	1	0.0	2.50	2	1	1	1	4
5	0.0	0	0.0	11300.00	9700.00	50.00	0.0	1	0.0	6.00	3	4	4	1	5
6	0.0112059	422	21.10	15600.00	10900.00	90.00	0.0	1	0.0	6.00	3	3	4	1	6
7	0.0684375	134	51.42	12800.00	7500.00	20.00	0.0	1	0.0	6.00	5	3	2	1	7

LOC	TIME 1	TIME 2	TIME 3	TIME 4	TIME 5	TIME 6	TIME 7	TIME 8	TIME 9	TIME10
1	11.47	22.95	34.42	45.89	57.37	68.84	80.31	91.78	103.26	999.99
2	11.47	22.95	34.42	45.89	57.37	68.84	80.31	91.78	103.26	999.99
3	11.47	22.95	34.42	45.89	57.37	68.84	80.31	91.78	103.26	999.99
4	11.47	22.95	34.42	45.89	57.37	68.84	80.31	91.78	103.26	999.99
5	11.47	22.95	34.42	45.89	57.37	68.84	80.31	91.78	103.26	999.99
6	11.47	22.95	34.42	45.89	57.37	68.84	80.31	91.78	103.26	999.99
7	11.47	22.95	34.42	45.89	57.37	68.84	80.31	91.78	103.26	999.99

LOC	PK(TF 1)	PK(TF 2)	PK(TF 3)	PK(TF 4)	PK(TF 5)	PK(TF 6)	PK(TF 7)	PK(TF 8)	PK(TF 9)	PK(TF10)
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1CUM		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0000997	0.0009949	0.0
2CUM		0.0	0.0	0.0	0.0	0.0	0.0	0.0000997	0.0010945	0.0010945
3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0003690	0.0	0.0
3CUM		0.0	0.0	0.0	0.0	0.0	0.0	0.0003690	0.0003690	0.0003690
4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4CUM		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5CUM		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0013700	0.0059808	0.0038855
6CUM		0.0	0.0	0.0	0.0	0.0	0.0	0.0013700	0.0073426	0.0111995
7	0.0	0.0	0.0	0.0	0.0024045	0.0001261	0.0195878	0.0465743	0.0008801	0.0
7CUM		0.0	0.0	0.0	0.0024045	0.0025303	0.0220685	0.0676150	0.0684355	0.0684355

LOC	PK(TI 1)	PK(TI 2)	PK(TI 3)	PK(TI 4)	PK(TI 5)	PK(TI 6)	PK(TI 7)	PK(TI 8)	PK(TI 9)	PK(TI10)
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1CUM		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0010945	0.0
2CUM		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0010945	0.0010945
3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0003690	0.0	0.0
3CUM		0.0	0.0	0.0	0.0	0.0	0.0	0.0003690	0.0003690	0.0003690
4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4CUM		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5CUM		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0070194	0.0042097
6CUM		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0070194	0.0111995

LOC	PK(TI 1)	PK(TI 2)	PK(TI 3)	PK(TI 4)	PK(TI 5)	PK(TI 6)	PK(TI 7)	PK(TI 8)	PK(TI 9)	PK(TT10)
7	0.0	0.0	0.0	0.0	0.0	0.0025023	0.0166461	0.0491013	0.0009465	0.0003037
7CUM		0.0	0.0	0.0	0.0	0.0025023	0.0191067	0.0672699	0.0681527	0.0684356

LOC	RHO 1	RHO 2	RHO 3	RHO 4	RHO 5	RHO 6	RHO 7	RHO 8	RHO 9
1	1.00000								
2	1.00000								
3	1.00000								
4	1.00000								
5	1.00000								
6	1.00000								
7	1.00000								

ATTRITION ACCRUED AS A FUNCTION OF TIME OF FIRE

TIME SEG.	CUM FOR CLASS 1	DENSITY CLASS 1	DENSITY CLASS 2	DENSITY CLASS 3	DENSITY CLASS 4	DENSITY CLASS 5	DENSITY CLASS 6	DENSITY CLASS 7	DENSITY CLASS 8	DENSITY CLASS 9
1	0.0	0.0								
2	0.0	0.0								
3	0.0	0.0								
4	0.0	0.0								
5	0.0024045	0.0024045								
6	0.0025303	0.0001261								
7	0.0220685	0.0195878								
8	0.0693287	0.0483268								
9	0.0766286	0.0078437								
10	0.0802163	0.0038855								

ATTRITION ACCRUED AS A FUNCTION OF TIME AT INTERCEPT

TIME SEG.	CUM FOR CLASS 1	DENSITY CLASS 1	DENSITY CLASS 2	DENSITY CLASS 3	DENSITY CLASS 4	DENSITY CLASS 5	DENSITY CLASS 6	DENSITY CLASS 7	DENSITY CLASS 8	DENSITY CLASS 9
1	0.0	0.0								
2	0.0	0.0								
3	0.0	0.0								
4	0.0	0.0								
5	0.0	0.0								
6	0.0025023	0.0025023								
7	0.0191067	0.0166461								
8	0.0676140	0.0454522								
9	0.0760475	0.0090451								
10	0.0802164	0.0045121								
	TOTALS	0.0802243								

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TOTAL PK FOR DENSITY CLASS 1 AS A FUNCTION OF ASPECT SECTOR AND IMPACT SPEED.

SECTOR	AZIMUTH REAR=00	ELEV. DOWN=00	0-152	152-305	305-457	457-610	610-762	762-914	914-1067	1067-1219	TOTAL PK
1	000-045	000-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	045-090	000-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	090-135	000-045	0.0	0.0	0.0	0.0	0.0001340	0.0	0.0	0.0	0.0001340
4	135-180	000-045	0.0	0.0	0.0	0.0	0.0002519	0.0	0.0	0.0	0.0002519
5	180-225	000-045	0.0	0.0003255	0.0012023	0.0	0.0	0.0	0.0	0.0	0.0015274
6	225-270	000-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	270-315	000-045	0.0	0.0000411	0.0	0.0	0.0	0.0	0.0	0.0	0.0000411
8	315-360	000-045	0.0001108	0.0001518	0.0	0.0	0.0	0.0	0.0	0.0	0.0002626
9	000-045	045-090	0.0	0.0000374	0.0	0.0	0.0	0.0	0.0	0.0	0.0000374
10	045-090	045-090	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	090-135	045-090	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	135-180	045-090	0.0	0.0	0.0	0.0	0.0007089	0.0	0.0	0.0	0.0007089
13	180-225	045-090	0.0	0.0	0.0058241	0.0025407	0.0167664	0.0030211	0.0	0.0	0.0279221
14	225-270	045-090	0.0	0.0036015	0.0002850	0.0	0.0000393	0.0	0.0	0.0	0.0039247
15	270-315	045-090	0.0	0.0	0.0000294	0.0	0.0	0.0	0.0	0.0	0.0000294
16	315-360	045-090	0.0	0.0006235	0.0002650	0.0	0.0	0.0	0.0	0.0	0.0008884
17	000-045	090-135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18	045-090	090-135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19	090-135	090-135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20	135-180	090-135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21	180-225	090-135	0.0	0.0	0.0	0.0	0.0	0.0392846	0.0	0.0	0.0392846
22	225-270	090-135	0.0	0.0	0.0	0.0	0.0001868	0.0017850	0.0	0.0	0.0019715
23	270-315	090-135	0.0	0.0	0.0	0.0054171	0.0	0.0	0.0	0.0	0.0054171
24	315-360	090-135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25	000-045	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26	045-090	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27	090-135	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
28	135-180	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29	180-225	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30	225-270	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
31	270-315	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
32	315-360	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		TOTALS	0.0001108	0.0047761	0.0075947	0.0079440	0.0180647	0.0436568	0.0	0.0	0.0802164

***** END OF JOB - - P001 SCENARIO RUN COMPLETE *****

APPENDIX H

P001 INPUT PROGRAM (PIP) LISTING

```
C*********************************************************************
C
C
C  'THIS PROGRAM WILL PUNCH ALL REQUIRED CARDS FOR THE EXECUTION OF THE
C   P001 ANALYSIS WITH THE EXCEPTION OF THE FIRST CARD (THE GREEN JOB
C   CARD) AND THE LAST CARD (THE ORANGE END OF FILE CARD).  THE MINIMAL
C   INPUT TO THIS PROGRAM IS THE X, Y AND Z COORDINATES FOR EACH OF THE
C   FLIGHT PATH MILESTONES.  SIX GUN EMPLACEMENT LOCATIONS MAY BE
C   SPECIFIED IF THE SIX PRESET GUN LOCATIONS ARE NOT DESIRED.  IF THE
C   PRESET GUN EMPLACEMENT LOCATIONS ARE USED, THE FINAL DATA CARD IS A
C   CONTROL CARD THAT SPECIFIES THE DESIRED INPUT, OUTPUT AND SCENARIO
C   OPTIONS.  IF THE PRESET GUN LOCATIONS ARE NOT USED, THE FINAL DATA
C   CARDS WILL BE THE 6 INPUT GUN LOCATION CARDS.
C
C   MILESTONE CARDS: THE X, Y, Z COORDINATES FOR UP TO 199 FLIGHT PATH
C   MILESTONES MUST BE ENTERED IN 3F10.0 FORMAT, ONE MILESTONE PER INPUT
C   CARD. THE VALUES (IN METERS) MUST BE ENTERED IN DECIMAL FORM WITH THE
C   X COORDINATE IN COLUMNS 1-10, THE Y COORDINATE IN COLUMNS 11-20 AND
C   Z COORDINATE IN COLUMNS 21-30.  THE DECIMAL POINT MUST APPEAR IN EACH
C   COORDINATE VALUE.
C
C   MILESTONE DELIMITER   CARD:  A CARD CONTAINING 99999. LEFT JUSTIFIED
C   (INPUT FORMAT F6.0) MUST BE PLACED AFTER THE FINAL MILESTONE CARD TO
C   MARK THE END OF THE MILESTONE DATA INPUT.
C
C   CONTROL CARD:  A CONTROL CARD SPECIFYING THE CRUISE SPEED, THE NUMBER
C   OF THE BOMB RELEASE MILESTONE (COUNT THE INITIAL POSITION AS MILE-
C   STONE 1), 8 INPUT/OUTPUT/SCENARIO OPTIONS AND THE JAMMER POWER
C   FOLLOWS THE "99999." CARD.  THE DATA ON THE OPTION CARD MUST BE
C   SPECIFIED IN F10.0, I2, 8I1, F10.0 FORMAT.
C
C        F10.0:  THE AIRCRAFT CRUISE SPEED IN METERS PER SECOND.
C        I2: THE NUMBER OF THE BOMB RELEASE MILESTONE.
C        I1:  EW OPTION - 0 FOR NO EW; 1 FOR EW (WITH EW, AN AIRBORNE
C   JAMMER IS USED TO JAM TRACKING RADARS.
C        I1:  ANTI-JAM OPTION - 0 FOR NO AJ; 1 FOR AJ (WITH AJ, RADAR
C   SYSTEMS WITH THE CAPABILITY USE AJ AGAINST THE JAMMER.)
C        I1:  MULTIPATH OPTION - 0 FOR NO MULTIPATH; 1 FOR MULTIPATH (IF
C   SPECIFIED, THE EFFECTS OF RADAR MULTIPATH ARE INCLUDED IN THE RADAR
C   SYSTEMS THAT ARE AFFECTED BY MULTIPATH.)
C        I1:  GUN EMPLACEMENT LOCATION INPUT OPTION - 0 FOR PRESET GUN
C   LOCATIONS; 1 FOR GUN EMPLACEMENT LOCATIONS INPUT AS DATA.
C        I1:  LIST OPTION - 0 FOR NO LISTING OF THE P001 INPUT DECK;
C   1 FOR LIST OF P001 INPUT DECK PROVIDED AS PART OF THE OUTPUT.
C        I1:  PUNCH OPTION - 0 FOR NO P001 INPUT PUNCHED CARDS DESIRED;
C   1 FOR P001 INPUT DECK PROVIDED AS PART OF THE OUTPUT.
C        I1:  PLOT OPTION - 0 FOR NO PLOT OF FLIGHT PATH AND GUN LOCATIONS
C   DESIRED; 1 FOR PLOT DESIRED.
```

```
C        I1:  EXTENDED OUTPUT OPTION - 0 FOR NO EXTENDED OUTPUT DESIRED;
C   1 FOR EXTENDED PRINTOUT DESIRED AS OUTPUT.
C        F10.0:  JAMMER POWER - MUST BE BETWEEN 0 TO 1000 WATTS.
C
C   GUN EMPLACEMENT LOCATION CARDS:  IF DESIRED AS INPUT DATA, THE 6 GUN
C   EMPLACEMENT LOCATION CARDS FOLLOW THE OPTION CONTROL CARD IN
C   THE SAME FORMAT AS THE MILESTONE CARDS (3F10.0).  THE GUN EMPLACEMENT
C   CARDS MUST BE PLACED IN THE FOLLOWING ORDER:  2 TYPE 1 MODE 1, 2 TYPE
C   2 MODE 1, 1 TYPE 3 MODE 4, 1 TYPE 3 MODE 3.  WHETHER OR NOT THE
C   PRESET GUN LOCATION OPTION IS SPECIFIED, 1 TYPE 5 MODE 3 WEAPON IS
C   ADDED TO THE SCENARIO.  THE LOCATION OF THIS GUN IS FIXED AND IS
C   SPECIFIED BY THE PROGRAM.
C
C   INPUT DECK EXAMPLE:  (FOR 10 MILESTONES)
C
C   1000.      -200.      100.
C   1200.      -300.      200.
C   1525.      -350.      450.
C   1800.      -400.      350.
C   2100.      -525.      400.
C   2350.      -655.      375.
C   2500.      -803.      425.
C   2819.     -1055.      450.
C   3000.     -1100.      500.
C   3200.     -1215.      625.
C   99999.
C   232.0      0711111110   500.0
C   1000.      2000.       60.
C   1200.      1600.       30.
C   2575.      -550.        0.
C   (ETC., UNTIL ALL  6 GUN EMPLACEMENTS ARE LOCATED.)
C
C
C*********************************************************************
C
C   /////*****MAIN PROGRAM*****/////
C
      DIMENSION X10(200), Y10(200)
      DIMENSION M(200), VEL(200), XDOT(200), YDOT(200), ZDOT(200), X(200
     1), Y(200), Z(200), HDG(200), CA(200), T(200), HDGDEG(200), CADEG(2
     200), RA(200), TINK(10), XGUN(15), YGUN(15), ZGUN(15), XCIRC(25), Y
     3CIRC(25)
      DIMENSION TNRT(200), ITNMAX(200), TNRTDG(200), TNCGR(200), ISTALL(
     1200), G(200), ABSRT(200), DT(200)
      DIMENSION RCSTAB(1000)
      DIMENSION VAT1N2(208), VAT3(208), VAT5(208)
C
C   PREDETERMINED GUN EMPLACEMENT LOCATIONS
```

```
C
      DATA XGUN/14800.,16200.,13600.,13400.,11300.,15600.,12800./
      DATA YGUN/9000.,8200.,7200.,8000.,9700.,10900.,7500./
      DATA ZGUN/40.,40.,20.,20.,50.,90.,20./
C
C   VULNERABLE AREA TABLE VS TYPE 1 AND 2 WEAPONS
C
      DATA VAT1N2/2*.4645,6*7.107,2*.6568,6*5.551,2*.6968,6*5.574,2*.656
     18,6*7.357,2*.6968,6*5.574,2*.6568,6*5.551,2*.6968,6*5.574,2*.6568,
     26*7.357,2*.6968,6*5.574,2*.4645,6*.7432,2*.6568,6*2.858,2*.4645,6*
     33.298,2*.6568,6*2.858,2*.4645,6*.7432,2*.6568,6*2.858,2*.4645,6*3.
     4298,2*.6568,6*2.858,2*.6568,6*5.551,2*.6968,6*5.574,2*.6568,6*7.35
     57,2*.6968,6*5.574,2*.6568,6*5.551,2*.6968,6*5.574,2*.6568,6*7.357,
     62*.6968,6*5.574,2*.4645,6*7.107/
C
C   VULNERABLE AREA TABLE VS TYPE 3 WEAPONS
C
      DATA VAT3/2*12.54,6*13.47,2*9.853,6*10.51,2*9.639,6*11.15,2*12.64,
     16*14.78,2*9.639,6*11.15,2*9.853,6*10.51,2*9.639,6*11.15,2*12.64,6*
     214.78,2*9.639,6*11.15,8*1.394,2*4.762,6*6.240,2*5.342,6*7.432,2*4.
     3762,6*6.240,8*1.394,2*4.762,6*6.240,2*5.342,6*7.432,2*4.762,6*6.24
     40,2*9.853,6*10.51,2*9.639,6*11.15,2*12.64,6*14.78,2*9.639,6*11.15,
     52*9.853,6*10.51,2*9.639,6*11.15,2*12.64,6*14.78,2*9.639,6*11.15,2*
     612.54,6*13.47/
C
C   VULNERABLE AREA TABLE VS TYPE 5 WEAPONS
C
      DATA VAT5/8*55.37,8*43.22,8*47.10,8*62.53,8*47.10,8*43.22,8*47.10,
     18*62.53,8*47.10,8*5.761,8*27.45,8*33.07,8*27.45,8*5.761,8*27.45,8*
     233.07,8*27.45,8*5.761,8*47.10,8*62.53,8*47.10,8*43.22,8*47.10,8*62
     3.53,8*47.10,8*55.37/
C
C   RADAR CROSS SECTION TABLE
C
      DATA RCSTAB/19*1000.,19*100.,.273,.178,.053,.023,.156,.166,.063,.1
     173,.235,.047,.02,.015,.011,.073,.072,.019,.028,.11,.454,.005,.005,
     2.007,.011,.093,.093,.039,.068,.112,.032,.019,.015,.009,.035,.032,.
     3017,.033,.102,.509,.273,.178,.053,.023,.156,.166,.063,.173,.235,.0
     447,.02,.015,.011,.073,.072,.019,.028,.11,.454,19*100.,19*1000./
C
C   CALL ERRSET SUPPRESSES ANY POSSIBLE UNDERFLOW PROBLEMS THAT MAY
C   RESULT FROM MANIPULATION OF SCENARIO PARAMETERS.
C
      CALL ERRSET (208,50,-1,1,1)
C
      PI = 3.14159
      MNUM = 0
      IBR = 0
```

```
C
C   READ THE MILESTONE CARDS, COUNT THE NUMBER OF MILESTONES AND STOP
C   INPUT UPON REACHING THE '99999.' DELIMITER CARC.
C
C
C
      DO 1 I=1,200
      READ (5,40) X(I),Y(I),Z(I)
      IF (X(I).EQ.99999.) GO TO 2
      MNUM = MNUM+1
      X10(I) = X(I)/2000.0
      Y10(I) = Y(I)/2000.0
    1 CCNTINUE
C
C
C
    2 CGNTINUE
C
C   READ THE CRUISE SPEED, BOMB RELEASE MILESTONE, EW OPTION, ANTI-JAM
C   CPTION, MULTIPATH OPTION, GUN LOCATICN INPUT OPTION AND THE LIST
C   PUNCH, PLOT AND EXTENDED OUTPUT OPTICNS AND THE JAMMER POWER.
C
      READ (5,42) CVEL,MBR,IEW,IAJ,IMULT,IGUN,ILST,IPNCH,IPLOT,IEXT,PJAM
C
C   JAMMER ON BUT JAMMER POWER = 0 ???  THEN TURN JAMMER OFF.
C
      IF (IEW.EQ.1.AND.PJAM.LE.0.0) IPJAM1=1
      IF (IPJAM1.EQ.1) IEW=0
      IF (IPJAM1.EQ.1) WRITE (6,43)
C
C   JAMMER POWER GREATER THAN 1000 WATTS ???  THEN LIMIT IT TO 1000 WATTS
C
      IF (PJAM.GT.1000) IPJAM2=1
      IF (IPJAM2.EQ.1) PJAM=1000
      IF (IPJAM2.EQ.1.AND.IEW.EQ.1) WRITE (6,44)
C
C   AJ ON BUT JAMMER OFF ???  THEN TURN AJ OFF.
C
      IF (IAJ.EQ.1.AND.IEW.EQ.0) WRITE (6,45)
      IF (IEW.EQ.0) IAJ = 0
C
C   CPTICN TO INPUT THE 6 ADDITIONAL GUN EMPLACEMENT LOCATIONS
C
      IF (IGUN.NE.1) GO TO 3
C
C
C
      DC 3 I=1,6
```

```
      READ (5,41,END=38) XGUN(I),YGUN(I),ZGUN(I)
    3 CONTINUE
C
C
C
C     CALCULATE THE X, Y AND Z VELOCITIES, THE CLIMB ANGLE, HEADING AND
C     ROLL ANGLE AND THE TIME AT EACH MILESTONE ALONG WITH VARIOUS OTHER
C     PARAMETERS FOR LATER USE.
C
C
C
      DO 9 I=1,MNUM
      IF (I.NE.MNUM) GO TO 4
C
C     CALCULATIONS FOR THE FINAL MILESTONE
C
      HDG(I) = HDG(I-1)
      HDGDEG(I) = HDG(I)*57.29578
      IF (HDGDEG(I).LT.0) HDGDEG(I)=HDGDEG(I)+360
      RA(I) = 0
      CADEG(I) = 0
      ZDOT(I) = 0
      XDOT(I) = VEL(I)*COS(HDG(I))
      YDOT(I) = VEL(I)*SIN(HDG(I))
      TNRT(I) = 0
      GO TO 8
C
C     GENERAL COORDINATE CALCULATIONS FOR LATER USE
C
    4 CONTINUE
      DX = X(I+1)-X(I)
      DX2 = DX**2
      DY = Y(I+1)-Y(I)
      DY2 = DY**2
      DZ = Z(I+1)-Z(I)
      DZ2 = DZ**2
      DIST = SQRT(DX2+DY2+DZ2)
C
C     CLIMB ANGLE CALCULATIONS
C
      CA(I) = ATAN2(DZ,SQRT(DX2+DY2))
      IF (CA(I).GT.1.5533) CA(I)=1.5533
      CADEG(I) = CA(I)*57.29578
C
C     HEADING CALCULATIONS
C
      IF (DX.NE.0.OR.DY.NE.0) GO TO 5
      HDG(I) = HDG(I-1)
```

```
      GC TO 6
    5 HCG(I+1) = ATAN2(DY,DX)
      HDG(1) = HDG(2)
    6 HCGDEG(I) = HDG(I)*57.29578
      IF (HDGDEG(I).LT.0) HDGDEG(I)=HDGCEG(I)+360
C
C     VELOCITY CALCULATIONS
C
      VEL(1) = CVEL
      VEL(I+1) = VEL(I)-TAN(CA(I))*DIST/100+(CVEL-VEL(I))*(DIST/VEL(I))/
     130
C
C     BCMB RELEASE POINT CONSIDERATIONS
C
      IF (I.EQ.MBR) IBR = 1
C
C     *****  RESTRICTION: MAX VEL PRIOR TO BOMB RELEASE POINT IS 260 MPS.
C
      IF (VEL(I+1).GT.260.AND.IBR.EQ.0) VEL(I+1)=260
C
C     *****  RESTRICTION: MAX VEL AFTER BCMB RELEASE PCINT IS 310 MPS.
C
      IF (VEL(I+1).GT.310.AND.IBR.NE.0) VEL(I+1)=310
      VAVG = (VEL(I)+VEL(I+1))/2
C
C     VELOCITY COMPONENT CALCULATIONS
C
      ZCOT(I) = VEL(I)*SIN(CA(I))
      XYVEL = VEL(I)*COS(CA(I))
      XDOT(I) = XYVEL*COS(HDG(I))
      YDOT(I) = XYVEL*SIN(HDG(I))
C
C     MILESTONE TIME CALCULATIONS
C
      T(1) = 0
      T(I+1) = T(I)+DIST/VAVG
      DT(I) = 1
      IF (I.EQ.1) GO TO 7
      DT(I) = T(I)-T(I-1)
C
C     TURN RATE AND ROLL ANGLE CALCULATIONS
C
    7 TNANG = HDG(I+1)-HDG(I)
      TNRT(I) = TNANG/DT(I)
      RA(I) = ATAN(TNRT(I)*VAVG/9.81)*57.29578
    8 CONTINUE
    9 CONTINUE
C
```

```
C
C
C     CARD 2 TIME INCREMENT CALCULATION
C
      TINC = T(MNUM)/1000
C
C     CARD 6 TIME INCREMENT CALCULATIONS
C
      TINKI = 0
C
C
C
      DO 10 I=1,9
      TINK(I) = TINKI+T(MNUM)/10
      TINKI = TINK(I)
   10 CONTINUE
C
C
C
C     /////*****PRINT PROGRAM*****/////
C
C
C     OPTION TO LIST THE P001 CARD DECK
C
      IF (ILST.EQ.0) GO TO 16
C
C     COMMENCE PRINTED OUTPUT OF THE P001 CARD DECK.
C
C
C     THE JCL CARDS.
C
      WRITE (6,47)
      WRITE (6,48)
      WRITE (6,49)
      WRITE (6,50)
      WRITE (6,51)
      WRITE (6,52)
      WRITE (6,51)
      WRITE (6,53)
      WRITE (6,51)
      WRITE (6,54)
      WRITE (6,51)
      WRITE (6,55)
      WRITE (6,51)
      WRITE (6,56)
C
C     BLANK CARD FOR RADAR MASK ANGLE = 0.
C
```

```
      WRITE (6,57)
C
C   THE CUTPUT TITLE CARC.
C
      WRITE (6,58)
C
C   CARD 2
C
      WRITE (6,59) T(MNUM),TINC
C
C   THE 2A CARDS (MILESTONES).
C
C
C
C
      DC 11 I=1,MNUM
      WRITE (6,60) T(I),X(I),Y(I),Z(I),XDOT(I),YDCT(I),ZDOT(I),HDGDEG(I)
     1,CADEG(I),RA(I)
   11 CONTINUE
C
C
C
      WRITE (6,61)
      WRITE (6,62)
C
C   CARD 3 (GUN EMPLACEMENT CARD).
C
      WRITE (6,63) XGUN(1),YGUN(1),ZGUN(1)
C
C   CARC 4 (GUN TYPE).
C
      WRITE (6,64)
C
C   CARD 5
C
      WRITE (6,65)
C
C   CARC 6
C
      WRITE (6,66) (TINK(I),I=1,9)
C
C   CARD 7 (VULNERABLE AREA TABLE VS TYPE 1 AND 2 WEAPONS)
C
      WRITE (6,67)
      WRITE (6,68) (VAT1N2(I),I=1,208)
C
C   CARD 12 (EXECUTE RUN).
C   EXTENDED OUTPUT OPTION
C
```

```
      IF (IEXT.NE.1) WRITE (6,70)
      IF (IEXT.EQ.1) WRITE (6,69)
C
C   THE REMAINDER OF THE CARDS INTRODUCE NEW GUN LCCATIONS, GUN TYPES
C   AND VULNERABLE AREA TABLES TO BE EXECUTED BY THE PROGRAM.
C
      WRITE (6,63) XGUN(2),YGUN(2),ZGUN(2)
C
C   EXTENDED OUTPUT OPTICN
C
      IF (IEXT.NE.1) WRITE (6,70)
      IF (IEXT.EQ.1) WRITE (6,69)
      WRITE (6,63) XGUN(3),YGUN(3),ZGUN(3)
      WRITE (6,71)
C
C   EXTENDED OUTPUT OPTION
C
      IF (IEXT.NE.1) WRITE (6,70)
      IF (IEXT.EQ.1) WRITE (6,69)
      WRITE (6,63) XGUN(4),YGUN(4),ZGUN(4)
C
C   EXTENDED OUTPUT OPTION
C
      IF (IEXT.NE.1) WRITE (6,70)
      IF (IEXT.EQ.1) WRITE (6,69)
      WRITE (6,63) XGUN(5),YGUN(5),ZGUN(5)
      WRITE (6,72)
C
C   CARD 7 (VULNERABLE AREA TABLE VS TYPE 3 WEAPONS)
C
      WRITE (6,147)
      WRITE (6,68) (VAT3(I),I=1,208)
C
C   EW (JAMMER) OPTION
C
      IF (IEW.NE.1) GO TO 12
      IRECM = 1
      SJTMAX = 3
C
C   CARC 14 (SPECIFIES EW OPTION AND JAMMER INFO.)
C
      WRITE (6,73) IEW,PJAM,IRECM,SJTMAX
C
C   WRITE THE RADAR CROSS SECTION TABLE.
C
      WRITE (6,74) (RCSTAB(I),I=1,133)
C
   12 CONTINUE
```

```
C
C
C     EXTENDED OUTPUT OPTION
C
         IF (IEXT.NE.1) WRITE (6,70)
         IF (IEXT.EQ.1) WRITE (6,69)
         WRITE (6,63) XGUN(6),YGUN(6),ZGUN(6)
         WRITE (6,75)
C
C     MULTIPATH OPTICN
C
         IF (IMULT.NE.1) GO TO 13
C
C     CARD 13 (MULTIPATH EFFECTS)
C
         IRMP = 1
         WRITE (6,76) IMULT,IRMP
C
      13 CONTINUE
C
C
C     EXTENDED OUTPUT OPTION
C
         IF (IEXT.NE.1) WRITE (6,70)
         IF (IEXT.EQ.1) WRITE (6,69)
         WRITE (6,63) XGUN(7),YGUN(7),ZGUN(7)
         WRITE (6,77)
C
C     CARD 7 (VULNERABLE AREA TABLE VS TYPE 5 WEAPONS)
C
         WRITE (6,148)
         WRITE (6,68) (VAT5(I),I=1,208)
C
C     MULTIPATH OPTICN
C
         IF (IMULT.NE.1) GO TO 14
C
C     CARD 13 (MULTIPATH EFFECTS)
C
         IRMP = 2
         WRITE (6,76) IMULT,IRMP
C
      14 CCNTINUE
C
C     EW (JAMMER) OPTION
C
         IF (IEW.NE.1) GO TO 15
         IRECM = 2
```

```
C
C     ANTI-JAM OPTION
C
         IF (IAJ.EQ.1) IRECM=3
         IF (IRECM.EQ.2) SJTMAX=1.5
         IF (IRECM.EQ.3) SJTMAX=17
C
C     CARD 14 (SPECIFIES EW OPTION AND JAMMER INFO.)
C
         WRITE (6,73) IEW,PJAM,IRECM,SJTMAX
C
C     WRITE THE RADAR CROSS SECTION TABLE.
C
         WRITE (6,74) (RCSTAB(I),I=1,133)
C
      15 CONTINUE
C
C
C     EXTENDED OUTPUT OPTION
C
         IF (IEXT.NE.1) WRITE (6,70)
         IF (IEXT.EQ.1) WRITE (6,69)
         WRITE (6,61)
         WRITE (6,78)
         WRITE (6,61)
C
C     /////*****PUNCH PROGRAM*****/////
C
C
C
C     OPTION TO PUNCH THE P001 CARD DECK
C
      16 CONTINUE
         IF (IPNCH.EQ.0) GO TO 22
C
C     COMMENCE PUNCHED OUTPUT OF THE P001 CARD DECK.
C
C
C
C     THE JCL CARDS.
C
         WRITE (7,79)
         WRITE (7,80)
         WRITE (7,81)
         WRITE (7,82)
         WRITE (7,83)
         WRITE (7,84)
         WRITE (7,83)
         WRITE (7,85)
         WRITE (7,83)
```

```
      WRITE (7,86)
      WRITE (7,83)
      WRITE (7,87)
      WRITE (7,83)
      WRITE (7,88)
C
C  LEADING BLANK DATA CARD SIGNIFIES RADAR MASKING ANGLE OF ZERO.
C
      WRITE (7,89)
C
C  THE CUTPUT TITLE CARD.
C
      WRITE (7,90)
C
C  CARD 2
C
      WRITE (7,91) T(MNUM),TINC
C
C  THE 2A CARDS (MILESTCNES).
C
C
C
      DC 17 I=1,MNUM
      WRITE (7,92) T(I),X(I),Y(I),Z(I),XDOT(I),YDCT(I),ZDOT(I),HDGDEG(I)
     1,CADEG(I),RA(I)
   17 CCNTINUE
C
C
C
      WRITE (7,93)
      WRITE (7,94)
C
C  CARD 3 (GUN EMPLACEMENT CARD).
C
      WRITE (7,95) XGUN(1),YGUN(1),ZGUN(1)
C
C  CARD 4 (GUN TYPE).
C
      WRITE (7,96)
C
C  CARD 5
C
      WRITE (7,97)
C
C  CARD 6
C
      WRITE (7,98) (TINK(I),I=1,9)
C
```

```
C   CARD 7 (VULNERABLE AREA TABLE VS TYPE 1 AND 2 WEAPONS)
C
       WRITE (7,99)
       WRITE (7,100) (VAT1N2(I),I=1,208)
C
C
C   CARD 12 (EXECUTE RUN).
C   EXTENDED OUTPUT OPTION
C
       IF (IEXT.NE.1) WRITE (7,102)
       IF (IEXT.EQ.1) WRITE (7,101)
C
C   THE REMAINDER OF THE CARDS INTRODUCE NEW GUN LOCATIONS, GUN TYPES
C   AND VULNERABLE AREA TABLES TO BE EXECUTED BY THE PROGRAM.
C
       WRITE (7,95) XGUN(2),YGUN(2),ZGUN(2)
C
C   EXTENDED OUTPUT OPTION
C
       IF (IEXT.NE.1) WRITE (7,102)
       IF (IEXT.EQ.1) WRITE (7,101)
       WRITE (7,95) XGUN(3),YGUN(3),ZGUN(3)
       WRITE (7,103)
C
C   EXTENDED OUTPUT OPTION
C
       IF (IEXT.NE.1) WRITE (7,102)
       IF (IEXT.EQ.1) WRITE (7,101)
       WRITE (7,95) XGUN(4),YGUN(4),ZGUN(4)
C
C   EXTENDED OUTPUT OPTICN
C
       IF (IEXT.NE.1) WRITE (7,102)
       IF (IEXT.EQ.1) WRITE (7,101)
       WRITE (7,95) XGUN(5),YGUN(5),ZGUN(5)
       WRITE (7,104)
C
C   CARD 7 (VULNERABLE AREA TABLE VS TYPE 3 WEAPONS)
C
       WRITE (7,149)
       WRITE (7,100) (VAT3(I),I=1,208)
C
C   EW (JAMMER) OPTION
C
       IF (IEW.NE.1) GO TC 18
       IRECM = 1
       SJTMAX = 3
C
```

```
C   CARD 14 (SPECIFIES EW OPTION AND JAMMER INFO.)
C
       WRITE (7,105) IEW,PJAM,IRECM,SJTMAX
C
C   WRITE THE RADAR CROSS SECTION TABLE.
C
       WRITE (7,106) (RCSTAB(I),I=1,133)
C
    18 CONTINUE
C
C
C   EXTENDED OUTPUT OPTION
C
       IF (IEXT.NE.1) WRITE (7,102)
       IF (IEXT.EQ.1) WRITE (7,101)
       WRITE (7,95) XGUN(6),YGUN(6),ZGUN(6)
       WRITE (7,107)
C
C   MULTIPATH OPTION
C
       IF (IMULT.NE.1) GO TO 19
       IRMP = 1
C
C   CARD 13 (MULTIPATH EFFECTS)
C
       WRITE (7,108) IMULT,IRMP
C
    19 CONTINUE
C
C
C   EXTENDED OUTPUT OPTION
C
       IF (IEXT.NE.1) WRITE (7,102)
       IF (IEXT.EQ.1) WRITE (7,101)
       WRITE (7,95) XGUN(7),YGUN(7),ZGUN(7)
       WRITE (7,109)
C
C   CARD 7 (VULNERABLE AREA TABLE VS TYPE 5 WEAPON)
C
       WRITE (7,150)
       WRITE (7,100) (VAT5(I),I=1,208)
C
C   MULTIPATH OPTION
C
       IF (IMULT.NE.1) GO TO 20
       IRMP = 2
C   CARD 13 (MULTIPATH EFFECTS)
C
```

```
      WRITE (7,108) IMULT,IRMP
C
   20 CCNTINUE
C
C  EW (JAMMER) OPTION
C
      IF (IEW.NE.1) GO TC 21
      IRECM = 2
C
C  ANTI-JAM OPTION
C
      IF (IAJ.EQ.1) IRECM=3
      IF (IRECM.EC.2) SJTMAX=1.5
      IF (IRECM.EC.3) SJTMAX=17
C
C  CARC 14 (SPECIFIES EW OPTION AND JAMMER INFO.)
C
      WRITE (7,105) IEW,PJAM,IRECM,SJTMAX
C
C  WRITE THE RADAR CROSS SECTION TABLE.
C
      WRITE (7,106) (RCSTAB(I),I=1,133)
C
   21 CONTINUE
C
C
C  EXTENDED OUTPUT OPTION
C
      IF (IEXT.NE.1) WRITE (7,102)
      IF (IEXT.EQ.1) WRITE (7,101)
      WRITE (7,93)
      WRITE (7,110)
      WRITE (7,93)
C
C
C  /////*****PLOT SECTICN*****/////
C
C
C  OPTICN TC PLOT THE P001 SCENARIO
C
   22 CCNTINUE
C
C  INITIALIZE PLOT
C
      CALL PLOTS
      IF (IPLOT.EQ.0) GO TO 25
C
C  ESTABLISH X AXIS
```

```
C
      REAL XTITLE/'      '/
      CALL AXIS (C.0,0.0,XTITLE,-1,9.0,C.0,0.0,2000.0)
C
C  ESTABLISH Y AXIS
C
      REAL YTITLE/'      '/
      CALL AXIS (0.0,0.0,YTITLE,0,6.0,90.0,0.0,2000.0)
C
C  COMPLETE OUTLINE
C
      REAL LX1(3)/0.0,9.0,9.0/
      REAL LY1(3)/6.0,6.0,0.0/
      CALL LINE (LX1,LY1,3,1,1)
C
C  PLOT THE ROAD
C
      REAL RDX1(26)/0.0,0.5,1.0,1.5,2.0,2.5,3.0,3.5,4.0,4.5,5.0,5.5,5.75
     1,6.0,6.5,6.86,7.0,7.2,7.3,7.4,7.5,7.6,7.7,8.C,8.5,9.0/
      REAL RDY1(26)/2.75,2.82,2.88,2.92,2.92,2.90,2.85,2.80,2.78,2.79,2.
     183,2.9,3.0,3.14,3.5,3.8,3.9,4.06,4.1,4.15,4.2,4.18,4.13,3.57,3.03,
     22.48/
      CALL LINE (RDX1,RDY1,26,1,1)
      REAL RDX2(12)/0.0,0.5,1.0,1.5,2.0,2.5,2.8,3.0,3.2,3.5,3.72,3.87/
      REAL RDY2(12)/2.55,2.65,2.72,2.76,2.76,2.73,2.7,2.6,2.5,2.25,2.0,1
     1.75/
      CALL LINE (RDX2,RDY2,12,1,1)
      REAL RDX3(14)/4.0,3.75,3.45,3.25,3.5,4.0,4.5,5.0,5.3,5.6,5.45,5.3,
     15.1,5.0/
      REAL RDY3(14)/1.8,2.2,2.5,2.65,2.62,2.6,2.61,2.65,2.7,2.76,2.6,2.4
     1,1.9,1.5/
      CALL LINE (RDX3,RDY3,14,1,1)
      REAL RDX4(19)/5.18,5.25,5.4,5.5,5.6,5.75,6.0,6.2,6.5,6.7,6.85,7.23
     1,7.35,7.5,7.6,7.7,7.95,8.35,9.0/
      REAL RDY4(19)/1.5,1.8,2.2,2.35,2.5,2.7,2.95,3.1,3.3,3.5,3.6,3.9,4.
     10,4.04,4.0,3.9,3.5,3.0,2.25/
      CALL LINE (RDX4,RDY4,19,1,1)
C
C  PLOT THE RIVER
C
      REAL RVX1(23)/0.0,0.5,1.0,1.35,1.5,2.0,2.3,2.5,3.0,3.5,4.C,4.5,5.0
     1,5.5,5.9,6.0,6.45,6.6,6.75,6.95,7.05,7.2,7.2/
      REAL RVY1(23)/5.73,5.55,5.0,4.5,4.38,4.1,4.0,3.95,3.9,3.92,3.9,3.7
     1,3.6,3.75,4.0,4.1,4.5,4.6,4.65,4.6,4.5,4.3,4.06/
      CALL LINE (RVX1,RVY1,23,1,1)
      REAL RVX2(27)/0.0,0.5,0.6,0.9,1.0,1.15,1.5,1.85,2.0,2.15,2.5,3.0,3
     1.5,4.0,4.2,4.5,5.0,5.5,5.8,6.0,6.1,6.35,6.5,6.7,6.85,6.9,6.86/
      REAL RVY2(27)/5.4,5.1,5.0,4.5,4.3,4.0,3.7,3.5,3.48,3.5,3.6,3.65,3.
```

```
     165,3.6,3.5,3.35,3.3,3.15,3.15,3.3,3.5,4.0,4.15,4.25,4.2,4.0,3.8/
      CALL LINE (RVX2,RVY2,27,1,1)
      REAL RVX3(11)/6.85,6.9,6.85,7.0,7.35,7.5,7.7,8.0,8.4,8.83,9.C/
      REAL RVY3(11)/3.6,3.35,3.0,2.6,2.3,2.25,2.2,1.65,1.3,1.0,0.8/
      CALL LINE (RVX3,RVY3,11,1,1)
      REAL RVX4(7)/7.23,7.3,7.3,7.5,8.0,8.5,9.0/
      REAL RVY4(7)/3.9,3.7,3.35,3.0,2.6,2.1,1.7/
      CALL LINE (RVX4,RVY4,7,1,1)
C
C   PLOT THE BIG ISLAND
C
      REAL BIX1(12)/7.84,8.0,8.14,8.31,8.4,8.38,8.2,8.0,7.85,7.83,7.85,7
     1.84/
      REAL BIY1(12)/2.3,2.22,2.18,1.8,1.7,1.63,1.68,1.82,2.0,2.1,2.2,2.3
     1/
      CALL LINE (BIX1,BIY1,12,1,1)
C
C   PLOT THE XY AXIS ARROWS
C
      REAL XYX1(9)/0.4,0.35,0.45,0.4,0.4,1.0,0.8,C.8,1.0/
      REAL XYY1(9)/1.0,0.8,0.8,1.0,0.4,0.4,0.45,0.35,0.4/
      CALL LINE (XYX1,XYY1,9,1,1)
      REAL XCHAR(1)/'X'/
      CALL SYMBOL (0.8,0.1,0.21,XCHAR,0.0,1)
      REAL YCHAR(1)/'Y'/
      CALL SYMBOL (0.1,0.8,0.21,YCHAR,0.0,1)
C
C   PLOT THE TRUE NORTH ARROW
C
      REAL TNX1(5)/2.0,2.0,1.95,2.05,2.0/
      REAL TNY1(5)/4.8,5.4,5.2,5.2,5.4/
      CALL LINE (TNX1,TNY1,5,1,1)
      REAL TNCHAR(1)/'N'/
      CALL SYMBOL (1.9,5.5,0.21,TNCHAR,0.0,1)
C
C   WRITE THE PLOT TITLE
C
      REAL PTITLE(6)/' AE ','3251',' POC','1 SC','ENAR','IO  '/
      CALL SYMBOL (2.3,6.5,0.21,PTITLE,0.0,24)
C
C   PLOT THE MILESTONES AND FLIGHT PATH
C
      CALL LINE (X10,Y10,MNUM,1,7)
C
C   PLOT THE BOMB RELEASE POINT
C
      RX = X10(MBR)
      RY = Y10(MBR)
```

```
      CALL LINE (RX,RY,1,1,6)
C
C   PLOT THE GUN LCCATIONS AND RANGE RADIUS
C
C
C
      DC 24 I=1,7
      T1M1X = XGUN(I)/2000.0
      T1M1Y = YGUN(I)/2000.0
      IF (I.GE.1) MKR = 3
      IF (I.GE.3) MKR = 4
      IF (I.GE.5) MKR = 5
      IF (I.GE.7) MKR = 2
      IF (I.GE.1) RAD = 0.78
      IF (I.GE.3) RAD = 0.91
      IF (I.GE.5) RAD = 1.42
      IF (I.GE.7) RAD = 3.52
      CALL LINE (T1M1X,T1M1Y,1,1,MKR)
C
C
C
      DO 23 J=1,25
      XCIRC(J) = T1M1X+RAD*COS(J*PI/12)
      YCIRC(J) = T1M1Y+RAD*SIN(J*PI/12)
      IF (XCIRC(J).LT.0) XCIRC(J)=0
      IF (YCIRC(J).LT.0) YCIRC(J)=0
      IF (XCIRC(J).GT.9) XCIRC(J)=9
      IF (YCIRC(J).GT.6) YCIRC(J)=6
   23 CCNTINUE
C
C
C
      CALL LINE (XCIRC,YCIRC,25,1,MKR)
   24 CCNTINUE
C
C
C
      CALL PLOT (0.0,12.0,-3)
      CALL PLCTE
   25 CONTINUE
C
C   /////***** ERROR CHECK SECTION *****/////
C
C   CPTICN SUMMARY
C
      WRITE (6,111) MNUM,T(MNUM),MBR
      WRITE (6,112)
      WRITE (6,113) CVEL
```

```
      IF (ILST.EQ.0) WRITE (6,114)
      IF (ILST.EQ.1) WRITE (6,115)
      IF (IPNCH.EQ.0) WRITE (6,116)
      IF (IPNCH.EQ.1) WRITE (6,117)
      IF (IPLOT.EQ.0) WRITE (6,118)
      IF (IPLOT.EQ.1) WRITE (6,119)
      IF (IEXT.NE.1) WRITE (6,145)
      IF (IEXT.EQ.1) WRITE (6,146)
      IF (IGUN.EQ.0) WRITE (6,120)
      IF (IGUN.EQ.1) WRITE (6,121)
      IF (IEW.EQ.0) WRITE (6,122)
      IF (IEW.EQ.1) WRITE (6,123)
      IF (IEW.EQ.1) WRITE (6,124) PJAM
      IF (IAJ.EQ.0) WRITE (6,125)
      IF (IAJ.EQ.1) WRITE (6,126)
      IF (IMULT.EQ.0) WRITE (6,127)
      IF (IMULT.EQ.1) WRITE (6,128)
      WRITE (6,129)
C
      IERR = 0
      POPALT = 0
C
C    *****  RESTRICTION:  NO TYPE 3 WEAPCN MAY BE LCCATED WITHIN 3000
C    METERS OF THE CENTER OF THE BRIDGE.
C
      XTGT = 1410C
      YTGT = 7900
      GDIST = SQRT((XTGT-XGUN(5))**2+(YTGT-YGUN(5))**2)
      IF (GDIST.LT.3000) WRITE (6,130) XGUN(5),YGUN(5),GDIST
      GDIST = SQRT((XTGT-XGUN(6))**2+(YTGT-YGUN(6))**2)
      IF (GDIST.LT.3000) WRITE (6,130) XGUN(6),YGUN(6),GDIST
C
C
C    *****  RESTRICTION:  INITIAL CRUISE VELOCITY MLST BE BETWEEN 206
C    AND 257 METERS PER SECOND.
C
      IF (CVEL.LT.206.OR.CVEL.GT.257) WRITE (6,131) CVEL
C
C
C
      DO 35 I=1,MNUM
C
C    CALCULATE DISTANCE TC TARGET
C
      CISTGT = SQRT((XTGT-X(I))**2+(YTGT-Y(I))**2)
C
C    *****  RESTRICTION: ALT MAX PRIOR TC POP UP IS 457 METERS.
C
```

```
      IZMAX = 0
      IF (DISTGT.GT.6000.AND.Z(I).GT.457) IZMAX=1
      IF (IZMAX.NE.1) GO TO 26
      IERR = 1
      WRITE (6,132) I,Z(I)
C
C ***** RESTRICTION: MIN ALT IS 61 METERS.
C
   26 IZMIN = 0
      IF (Z(I).LT.61) IZMIN=1
      IF (IZMIN.NE.1) GO TO 27
      IERR = 1
      WRITE (6,133) I,Z(I)
C
C ***** RESTRICTION: MAX ALT OVERALL IS 2134 METERS.
C
   27 IZZMAX = 0
      IF (Z(I).GT.2134) IZZMAX=1
      IF (IZZMAX.NE.1) GO TO 28
      IERR = 1
      WRITE (6,134) I,Z(I)
C
C ***** RESTRICTION: MIN POP UP ALT IS 1219 METERS.
C
   28 CONTINUE
      IF (DISTGT.GT.6000) GO TO 29
      IF (Z(I).GT.POPALT) POPALT=Z(I)
      IPOP = 0
      IF (I.EQ.MBR.AND.POPALT.LT.1219) IPOP=1
      IF (IPOP.NE.1) GO TO 29
      IERR = 1
      WRITE (6,135) POPALT
C
C ***** RESTRICTION: ACFT HEADING MUST BE WITHIN 5 DEGREES OF THE
C CENTER OF THE BRIDGE DURING THE LEG PRIOR TO BOMB RELEASE POINT.
C
   29 CONTINUE
      IF (I.NE.MBR) GO TO 33
      DX = XTGT-X(I)
      DY = YTGT-Y(I)
      TGTHDG = ATAN2(DY,DX)*57.29578
      IF (TGTHDG.LT.0) TGTHDG=TGTHDG+360
      HDGLMT = ABS(HDGDEG(I)-TGTHDG)
      IAIM = 0
      IF (HDGLMT.GT.5) IAIM=1
      IF (IAIM.NE.1) GO TO 30
      IERR = 1
      WRITE (6,136) HDGDEG(I),TGTHDG,HDGLMT
```

```
C
C     *****  RESTRICTION: THE LEG PRIOR TO THE BOMB RELEASE POINT MUST BE
C     A MINIMUM OF 2 SECONDS IN DURATION TO ENSURE PROPER AIM.
C
   30 ITIME = 0
      TDIFF = T(MBR)-T(MBR-1)
      IF (TDIFF.LT.2) ITIME=1
      IF (ITIME.NE.1) GO TO 31
      IERR = 1
      WRITE (6,137) TDIFF
C
C     *****  RESTRICTION: BOMB RELEASE ALT MUST BE BETWEEN 305 TO 914 M.
C
   31 IMBR = 0
      IF (Z(MBR).LT.305.OR.Z(MBR).GT.914) IMBR=1
      IF (IMBR.NE.1) GO TO 32
      IERR = 1
      WRITE (6,138) Z(MBR)
C
C     *****  RESTRICTION: BOMBS CAN NOT BE RELEASED AT A DISTANCE GREATER
C     THAN 1000 METERS FROM THE TARGET.
C
   32 IDIST = 0
      IF (DISTGT.GT.1000) IDIST=1
      IF (IDIST.NE.1) GO TO 33
      IERR = 1
      WRITE (6,139) DISTGT
   33 CONTINUE
C
C     *****  RESTRICTION: STALL OCCURS AT 90 MPS.
C
      ISTALL(I) = 0
      IF (VEL(I).LT.90) ISTALL(I)=1
      IF (ISTALL(I).NE.1) GO TO 34
      IERR = 1
      WRITE (6,140) I,VEL(I),I
C
C     *****  RESTRICTION: MAX 'G' LIMIT IS 6.
C
   34 ABSRT(I) = ABS(TNRT(I))
      G(I) = SQRT(ABSRT(I)**2*VEL(I)**2/9.81**2+1)
      ITNMAX(I) = 0
      IF (G(I).GT.6) ITNMAX(I)=1
      IF (ITNMAX(I).NE.1) GO TO 35
      TNRTDG(I) = ABS(TNRT(I))*57.29578
      TNCOR(I) = DT(I)*0.25*57.29578
      IERR = 1
      WRITE (6,141) I,TNRTDG(I),G(I),I,TNCOR(I)
```

```
C
   35 CONTINUE
C
C
C
      IF (IERR.EQ.1) GO TO 36
      WRITE (6,142)
   36 CONTINUE
      IF (IERR.NE.1) GO TO 37
      WRITE (6,143)
   37 CCNTINUE
      WRITE (6,144)
C
      GO TO 39
   38 WRITE (6,46)
   39 CONTINUE
C  /////***** FORMAT STATEMENTS *****/////
C
C
      STOP
C
C
C
   40 FORMAT (3F10.0)
   41 FORMAT (3F10.0)
   42 FCRMAT (F10.0,I2,8I1,F10.0)
   43 FORMAT (1X,'THE JAM FUNCTION IS SPECIFIED, BUT THE JAMMER POWER ',
     1 'IS SPECIFIED AS ZERO.',       /1X,'THE JAM FUNCTION HAS BEEN ',
     2 'TURNED OFF.',/////)
   44 FCRMAT (1X,'THE SPECIFIED JAMMER FCWER IS GREATER THAN 1000 ',
     1 'WATTS AND HAS BEEN LIMITED TO 1000 WATTS.',/////)
   45 FCRMAT (1X,'THE ANTI-JAM FUNCTICN IS SPECIFIEC; HOWEVER, THE ',
     1'JAM FUNCTION IS NOT SPECIFIED.',/1X,'THE ANTI-JAM FEATURE HAS ',
     2'BEEN TURNEC OFF.',/////)
   46 FORMAT (1X,'GUN EMPLACEMENT DATA WAS SPECIFIED AS PART CF THE ',
     1 'INPUT DATA; HOWEVER, EITHER NO GUN EMPLACEMENT',/1X,'DATA IS ',
     2 'PART OF THE INPUT OR  ALL   SIX    GUN LOCATIONS WERE NOT ',
     3 'SPECIFIED.    EXECUTION TERMINATES.')
   47 FCRMAT (1X,'// EXEC PGM=P1EW,REGICN=200K')
   48 FORMAT (1X,'//STEPLIB DD DSN=F0559.P1EW,UNIT=3330,',
     1 'VOL=SER=DISK02,DISP=SHR')
   49 FCRMAT (1X,'//FT06F001 DD SYSOUT=A,DCB=(RECFM=FBA,',
     1'LRECL=133,BLKSIZE=3325)')
   50 FORMAT (1X,'//GO.FT04F001 DD UNIT=SYSDA,SPACE=(CYL,(1,1)),')
   51 FCRMAT (1X,'//         DCB=(RECFM=VBS,LRECL=404,BLKSIZE=3236)')
   52 FCRMAT (1X,'//GO.FT07F001 DD UNIT=SYSDA,SPACE=(CYL,(1,1)),')
   53 FORMAT (1X,'//GO.FT08F001 DD UNIT=SYSDA,SPACE=(CYL,(1,1)),')
   54 FCRMAT (1X,'//GO.FT09F001 DD UNIT=SYSDA,SPACE=(CYL,(1,1)),')
```

```
55 FORMAT (1X,'//FT11F001 DD UNIT=SYSDA,SPACE=(CYL,(1,1)),')
56 FORMAT (1X,'//GO.FT05F001 DD *')
57 FORMAT (1X,'     ')
58 FORMAT (1X,'01  AIRCRAFT COMBAT SURVIVABILITY SCENARIC')
59 FORMAT (1X,'02',4X,'12',8X,F7.2,1X,F7.4)
60 FORMAT (1X,10(F7.1,1X))
61 FORMAT (1X,'/*')
62 FORMAT (1X,'//GO.FT05F002 DD *')
63 FORMAT (1X,'03',6X,3(1X,F7.0))
64 FORMAT (1X,'04 11111')
65 FORMAT (1X,'05',5X,'11.0')
66 FORMAT (1X,'06',3X,'1 9',9(F7.3,1X))
67 FORMAT (1X,'07  VULNERABLE AREA TABLE VS TYPE 1 AND 2 WEAPONS')
68 FORMAT (1X,8F8.3)
69 FORMAT (1X,'121111111')
70 FORMAT (1X,'12')
71 FORMAT (1X,'04 21111')
72 FORMAT (1X,'04 34411')
73 FORMAT (1X,'14',I3,2X,'5 0 1.0',7X,F6.1  ,4X,'1.0E-06',6X,'1',11X,
  1 '1.0',6X,I5,F10.2 ,/1X,'GEND',/1X,3X,'19    7   90.0    180.0',
  2 '    1000.0')
74 FORMAT (1X,8F10.3,/1X,8F10.3,/1X,3F10.3)
75 FORMAT (1X,'04 33411')
76 FORMAT (1X,'13',I3,I5,' 0.35')
77 FORMAT (1X,'04 53211')
78 FORMAT (1X,'//GO.FT05F003 DD *')
79 FORMAT ('// EXEC PGM=P1EW,REGION=200K')
80 FORMAT ('//STEPLIB DD DSN=F0559.P1EW,UNIT=3330,',
  1 'VOL=SER=DISK02,DISP=SHR')
81 FORMAT ('//FT06F001 DD SYSOUT=A,DCB=(RECFM=FBA,',              'LR
  1ECL=133,BLKSIZE=3325)')
82 FORMAT ('//GO.FT04F001 DD UNIT=SYSDA,SPACE=(CYL,(1,1)),')
83 FORMAT ('//        DCB=(RECFM=VBS,LRECL=404,BLKSIZE=3236)')
84 FORMAT ('//GO.FT07F001 DD UNIT=SYSDA,SPACE=(CYL,(1,1)),')
85 FORMAT ('//GO.FT08F001 DD UNIT=SYSDA,SPACE=(CYL,(1,1)),')
86 FORMAT ('//GO.FT09F001 DD UNIT=SYSDA,SPACE=(CYL,(1,1)),')
87 FORMAT ('//FT11F001 DD UNIT=SYSDA,SPACE=(CYL,(1,1)),')
88 FORMAT ('//GO.FT05F001 DD *')
89 FORMAT ('     ')
90 FORMAT ('01  AIRCRAFT COMBAT SURVIVABILITY SCENARIO')
91 FORMAT ('02',4X,'12',8X,F7.2,1X,F7.4)
92 FORMAT (10(F7.1,1X))
93 FORMAT ('/*')
94 FORMAT ('//GO.FT05F002 DD *')
95 FORMAT ('03',6X,3(1X,F7.0))
96 FORMAT ('04 11111')
97 FORMAT ('05',5X,'11.0')
98 FORMAT ('06',3X,'1 9',9(F7.3,1X))
```

```
 99 FCRMAT ('07  VULNERABLE AREA TABLE VS TYPE 1 AND 2 WEAPONS')
10C FORMAT (8F8.3)
101 FCRMAT ('121111111')
1C2 FORMAT ('12')
103 FORMAT ('04 21111')
104 FCRMAT ('04 34411')
105 FORMAT ('14',I3,'  5 0 1.0',7X,F6.1  ,4X,'1.0E-06',6X,'1',11X,
   1 '1.0',6X,I5,F10.2 ,/'GEND',/,3X,'19     7    90.0     180.0      ',
   2 '1000.0')
106 FORMAT (8F1C.3,/,8F10.3,/,3F10.3)
107 FCRMAT ('04 33411')
108 FORMAT ('13',I3,I5,' C.35')
109 FORMAT ('04 53211')
110 FORMAT ('//GO.FT05F003 DD *')
111 FORMAT ('1','*****  P001 FLIGHT PATH SCENARIO SUMMARY  *****',///,
   1' THE FLIGHT PATH CONSISTS OF ',I3,' MILESTCNES WITH A TOTAL ',
   2 'FLIGHT TIME OF ',F6.1,' SECONDS.',/1X,
   3 'BOMB RELEASE IS AT MILESTONE ',I3,' .',/////)
112 FCRMAT (1X,'*****  OPTION SUMMARY  *****',///)
113 FCRMAT (1X,'CRUISE SPEED IS ',F6.1,' METERS PER SECOND.')
114 FORMAT (1X,'A P001 INPUT LISTING IS NOT SPECIFIED AS CUTPUT.')
115 FCRMAT (1X,'A P001 INPUT LISTING IS PROVIDEC AS OUTPUT.')
116 FORMAT (1X,'A PUNCHED DECK IS NOT SPECIFIED AS OUTPUT.')
117 FORMAT (1X,'A PUNCHED DECK IS PROVIDED AS OUTPUT.')
118 FORMAT (1X,'A SCENARIO PLOT IS NCT SPECIFIEC AS OUTPUT.')
119 FORMAT (1X,'A SCENARIO PLOT IS PRCVIDED AS CUTPUT.')
120 FORMAT (1X,'PRESET GUN EMPLACEMENT LOCATIONS ARE UTILIZED.')
121 FCRMAT (1X,'GUN EMPLACEMENT LOCATICNS ARE SFECIFIEC AS INPUT.')
122 FORMAT (1X,'AN AIRBORNE JAMMER IS NOT BEING UTILIZED.')
123 FCRMAT (1X,'AN AIRBORNE JAMMER IS BEING UTILIZED.')
124 FORMAT (1X,'JAMMER POWER IS ',F6.1,' WATTS.')
125 FORMAT (1X,'ANTI-JAM FEATURE IS NCT SELECTED.')
126 FORMAT (1X,'ANTI-JAM FEATURE IS UTILIZED WHERE APPROPRIATE.')
127 FORMAT (1X,'MULTIPATH RADAR EFFECTS ARE NCT CONSIDEREC.',/////)
128 FORMAT (1X,'MULTIPATH RADAR EFFECTS ARE CONSIDERED.',/////)
129 FCRMAT (1X,'*****  FLIGHT PATH ERRCRS  *****',///)
130 FORMAT (1X,'GUN TYPE 3 LOCATED AT X: ',F7.1,'  Y: ',F7.1,' IS ',
   1 F6.1,' METERS FROM THE TARGET',/1X,'WHICH IS LESS THAN THE ',
   2 'MINIMUM DISTANCE OF 3000 METERS.',///)
131 FCRMAT (1X,'CRUISE SPEED IS ',F6.1,' METERS PER SECOND WHICH IS ',
   1 'NOT WITHIN THE GIVEN LIMITS OF BETWEEN',/1X,'206 AND 257 ',
   2 'METERS PER SECOND.',///)
132 FORMAT (1X,'ALTITUDE AT MILESTONE ',I3,' IS ',F7.1,' METERS WHICH'
   1 ,' IS ABOVE THE MAX ALT PRIOR TO POP UP OF 457 METERS.',///)
133 FORMAT (1X,'ALTITUDE AT MILESTONE ',I3,' IS ',F7.1,' METERS WHICH'
   1 ,' IS BELOW THE MIN ALT OF 61 METERS.',///)
134 FORMAT (1X,'ALTITUDE AT MILESTONE ',I3,' IS ',F7.1,' METERS WHICH'
   1 ,' IS ABOVE THE MAX ALT OF 2134 METERS.',///)
```

```
135 FORMAT (1X,'MAX ALTITUDE DURING POP UP WAS ',F6.1,' METERS WHICH',
   1 ' IS LESS THAN THE MINUMUM POP UP ALTITUDE',/1X,
   2 'OF 1219 METERS.',///)
136 FORMAT (1X,'THE AIRCRAFT HEADING INTO THE BOMB RELEASE POINT IS ',
   1 F5.1,'  .  THE HEADING TO THE TARGET IS ',F5.1,' .',/1X,
   2 'THE HEADING DIFFERENCE IS ',F5.1,' WHICH IS GREATER THAN THE ',
   3 '5 DEGREE MAXIMUM DIFFERENCE LIMIT.',///)
137 FORMAT (1X,'THE LENGTH OF THE LEG IMMEDIATELY PRIOR TO THE BOMB ',
   1 'RELEASE POINT IS ',F4.2,' SECONDS ',/1X,         'IN DURATION ',
   2 'WHICH IS LESS THAN THE MINIMUM OF 2 SECONDS.',///)
138 FORMAT (1X,'THE BOMB RELEASE ALTITUDE IS ',F7.1,' METERS WHICH IS'
   1,' NOT IN THE BOMB RELEASE ALTITUDE',/1X,'RANGE OF BETWEEN 305 TO'
   2 ,' 914 METERS.',///)
139 FORMAT (1X,'THE BOMB WAS RELEASED AT A DISTANCE OF ',F7.1,
   1 ' METERS FROM THE TARGET WHICH IS IN EXCESS',/1X,'OF THE 1000 ',
   2 'METER BOMB RELEASE MAXIMUM RANGE.',///)
140 FORMAT (1X,'MILESTONE ',I3,' VELOCITY IS ',F6.1,' METERS PER',
   1' SECOND.  STALL OCCURS AT 90 METERS PER SECOND.  DECREASE',    /1X
   2,'THE CLIMB ANGLE PRIOR TO MILESTONE ',I3,' .',///)
141 FORMAT (1X,'MILESTONE ',I3,' TURN RESULTS IN A TURN RATE OF ',1X,F
   15.1,' DEGREES PER SECOND WHICH RESULTS IN A G LOADING',/1X,    ' O
   2F ',F5.1,' WHICH IS IN EXCESS OF',   ' THE 6 G MAX LOADING.',   '
   3DECREASE THE TURN ANGLE AT MILESTONE ',I3,' TO BELOW ',         F5.
   41,' DEGREES.',///)
142 FORMAT (1X,'*****  NO FLIGHT PATH ERRORS IN THIS RUN  *****',///)
143 FORMAT (1X,'*****  NO FURTHER FLIGHT PATH ERRORS  *****',///)
144 FORMAT (1X,'*****  END OF P001 INPUT PROGRAM - SUMMARY COMPLETE',
   1 '  *****')
145 FORMAT (1X,'THE EXTENDED OUTPUT OPTION IS NOT SPECIFIED.')
146 FORMAT (1X,'EXTENDED PRINTOUT IS PROVIDED AS OUTPUT.')
147 FORMAT (1X,'07  VULNERABLE AREA TABLE VS TYPE 3 WEAPONS')
148 FORMAT (1X,'07  VULNERABLE AREA TABLE VS TYPE 5 WEAPON')
149 FORMAT ('07  VULNERABLE AREA TABLE VS TYPE 3 WEAPONS')
150 FORMAT ('07  VULNERABLE AREA TABLE VS TYPE 5 WEAPON')
    END
```

APPENDIX I

P001 PROGRAM LISTING (IBM)

```
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
C                                                                     C
C     AAASIM -- MLLTIPLE GUN ANTIAIRCRAFT ARTILLERY SIMULATION        C
C     WRITTEN BY THOMAS D. MCMURCHIE AND JAMES D. SEVERSON            C
C     AIRFORCE ARMAMENT LABORATORY (AFATL-DLYS) EGLIN AFB, FLORIDA    C
C                                                                     C
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
C                                                                     C
C                    PROGRAM RECEIVED 25 OCT 72                       C
C                CONVERTED AND MAINTAINEC BY ASD/XROA                 C
C                                                                     C
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
C                                                                   C
C   MODIFIED FOR USE ON IBM 360/370 AT NPS MONTEREY, CA., 7 MAR 78.  C
C   FOR INFORMATION CALL PROF R.E. BALL 408-646-2885, (AUTOVON 878). C
C                                                                   C
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
C
      CCMMON/BLOCK1/ITITLE(20)
      COMMON/BLOCK2/NFPA,TMIN,TMAX,DTFPA
      CCMMON/BLOCK3/XGUN,YGUN,ZGUN
      COMMON/BLOCK4/IGT,IEM,ICB,ISB,IGL,CIRCLE
      COMMON/BLOCK5/NRHOS,RHO(9)
      CCMMON/BLOCK6/NTINTS,TINTER(10)
      COMMON/BLOCK7/IVACOM(20),VAT(9,5,9)
      CCMMON/BLOCK8/TREACT,TRACK1,TRACK2
      COMMON/BLOCK9/TROUND(6),THDMAX(6),PHDMAX(6),PHIMIN(6),PHIMAX(6),
     1    VELMIN(6),VELMAX(6),RANMIN(6),RANMAX(6),
     2     ATLAG(6),ETHMAX(6),EPHMAX(6),RMODES(6)
      CCMMON/BLOCKA/TFMAX1(6),TFMAX2(6),RVACON(6),RVBCON(6),VMUZEL(6)
      CCMMON/CONSTS/DEGREE,RADIAN,PI,PI2,QTRPI,SQRT2
      CCMMON/HEADFO/LINE,NUMBER
      CCMMON/NFPARM/XA,YA,ZA,RA2,RA,TIME
      COMMON/IGXGYG/IG,XG(8),YG(8)
      CCMMON/MAGIC /FRACT,INDEX1,INDEX2
      COMMON/VSASBS/VMUZZ,ASHCON,BSHCON,CQUAD
      CCMMON/BUDGET/BDACON(6)
      COMMON/CECM1/IRECM,IJ,GAINJ,IX,XSEC,CALX,PJW,
     *        X,Y,Z,ROL,PIT,HDG,
     *         FTGT,FJAM,GJ,SJT,SN
      COMMON /NEWA/ VY1,VY,ALFA,J,IRMP,PLEN,O1,O8,D1,JJJ,XR,ZT,PZI,IERR
      CCMMON /NEWB/ Y1,P2,VX,BETA,IF6,IMUL,IP,N,O7,D,TTRACK,KMODE,PSI,K
      CCMMON /NEWC/ CP,X2,P1,B2,JFILE,IJAM,ISL,O4,CPS,TPERS,JMODE,YT,T2
      CCMMON /NEWD/ T33,X1,Z2,B1,VX2,C3,CPK,NROUND,IOFF,I,XT,TM,SP,T1
      COMMON /NEWE/ Z1,A2,VX1,VZ2,PHI,IF5,IEOF,YR,IF2,T13,IFILE,Y2,A1
      COMMON /NEWF/ V2,VZ1,V,FUZZ,IF9,SD2RJ,SD2RJM,V1,VY2,F,JP,IF7,REFC
      COMMON /NEWG/ SJTMAX,O2,PK,D2,ISW
      CCMMON XFPA(1201),YFPA(1201),ZFPA(1201),BFPA(1201),AFPA(1201),
```

```
      1        FFPA(1201),VXFPA(1201),VYFPA(1201),VZFPA(1201)
       CCMMON ICARD(20),PTOTTF(10),PTOTTI(10)
       COMMON SPKTOT(32,8),IPRINT(6),IFLAGS(4)
       CCMMON    PKTTDC(9),PKTIDC(10,9),PKTFDC(10,9)
       CCMMON INUNIT
       DIMENSION TEMP(16,6),SPKT(8,4,8),SPKT2(32,8)
       EQUIVALENCE (SPKT2(1,1),SPKT(1,1,1),TEMP(1,1))
C
C      SOME EQUIVALENCES REMOVED BY B.E.E. BY CARRYING TWO VARIABLES
C          THROUGH PROGRAM WITH SAME VALUES FOR CLARITY.
C
       DATA ESVPCT/0.10/
       DATA SD2J/0./
       DATA ILOOP/-1/
       INUNIT = 5
       IFLAGS(1) = 0
       IFLAGS(2) = 0
       IFLAGS(3) = 0
       IFLAGS(4) = 0
       CALL REREAD
       CALL ERRSET(208,256,-1,1,1,207)
       ASSIGN 9996 TO IERR
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
C                                                                     C
C IIIII   N   N  IIIII  TTTTT  IIIII    A    L      IIIII  ZZZZZ  EEEEE C
C   I     NN  N    I      T      I     A A   L        I       Z   E     C
C   I     N N N    I      T      I    A   A  L        I     ZZZZZ  EEE  C
C   I     N  NN    I      T      I    AAAAA  L        I     Z     E     C
C IIIII   N   N  IIIII    T    IIIII  A   A  LLLLL  IIIII  ZZZZZ  EEEEE C
C                                                                     C
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
       READ(INUNIT,1050) ISW,AMASK
       AMASK1=AMASK*57.3
       PRINT 38,AMASK1
   38  FORMAT(5X,25HMASK ANGLE FOR THIS RUN =,F6.3,5H DEG.)
 1050  FORMAT(A2,8X,F10.5)
   95  ISL=1
       IMUL = 0
       IJAM = 0
       SD2RJ = 0.
       SD2J = 0.
       DO 96 J=1,9
       PKTTDC(J)=0.0
       DO 96 I=1,10
       PKTIDC(I,J)=0.0
   96  PKTFDC(I,J)=0.0
       DO 94 I=1,32
       DO 94 J=1,8
```

```
   94 SPKTOT(I,J)=0.0
      REWIND 7
      GO TO 8888
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
C                                                                     C
C                SSSS   EEEEE  TTTTT  U   U  PPPP                     C
C               S       E        T    U   U  P   P                    C
C                SSS    EEEE     T    U   U  PPPP                     C
C                   S   E        T    U   U  P                        C
C               SSSS    EEEEE    T     UUU   P                        C
C                                                                     C
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
   87 NROUND=0
      IF(IMUL.EQ.1 .AND. IEM.NE.3) GO TO 9994
      IF(IJAM.EQ.1 .AND. (IEM.EQ.1 .OR. IEM.EQ.2)) GO TO 9995
      CPS=1.0
      DC 14 I=1,NTINTS
      PTOTTF(I)=0.0
   14 PTOTTI(I)=0.0
      DC 27 I=1,32
      DO 27 J=1,8
   27 SPKT2(I,J)=0.0
      TPERS=TROUND(IGT)/FLOAT(IGL*ICB)
      IF(IEM.GT.1)GO TO 90
      TFMAX=TFMAX1(IGT)
      TTRACK=TRACK1
      GO TO 91
   90 TFMAX=TFMAX2(IGT)
      TTRACK=TRACK2
      VXES = 0.0
      VYES = 0.0
      VZES = 0.0
   91 TIME=TMIN
      TFIRE= TMIN+TTRACK
      IF(TFIRE.GT.TMAX)GO TO 69
      TTFMAX=1.2*TFMAX
      ATLCON=0.125/ATLAG(IGT)
      EMDTA=EXP(-0.512*ATLCON)
      ETMAX=ETHMAX(IGT)
      EPMAX=EPHMAX(IGT)
      VMUZZ=VMUZEL(IGT)
      TCMAX=THDMAX(IGT)
      PCMAX=PHDMAX(IGT)
      PHMIN=PHIMIN(IGT)
      PHMAX=PHIMAX(IGT)
      ASHCON=RVACCN(IGT)
      BSHCON=RVBCCN(IGT)
      RSMODE=RMODES(IGT)
```

```
      RMIN =RANMIN(IGT)
      RMAX =RANMAX(IGT)
      VMIN=VELMIN(IGT)
      VMAX=VELMAX(IGT)
      IG=1
      LINE=66
      IF (IPRINT(6).LE.0) GO TO 60
      CALL PAGES(5,0,JP)
      WRITE (6,1013) ISL,IGT,IEM,XGUN,YGUN,ZGUN,CIRCLE
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
C                                                                    C
C                  TTTTT  RRRR     A     CCC   K   K                 C
C                    T    R   R   A A   C   C  KK K                  C
C                    T    RRRR   A   A  C      K K                   C
C                    T    R  R   AAAAA  C   C  K  K                  C
C                    T    R   R  A   A   CCC   K   K                 C
C                                                                    C
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
C
C   COMPUTE ACTUAL AIRCRAFT PARAMETERS AT FIRE TIME FOR USE IN ERROR EQS
C
   60 CALL INTERP(TIME/DTFPA)
      X=GETVAL(XFPA)-XGUN
      Y=GETVAL(YFPA)-YGUN
      Z=GETVAL(ZFPA)-ZGUN
      VX=GETVAL(VXFPA)
      VY=GETVAL(VYFPA)
      VZ=GETVAL(VZFPA)
      ILOOP = ILOCP+1
      RCL = GETVAL(PFPA)
      PIT = GETVAL(AFPA)
      HDG = GETVAL(BFPA)
      G2=X*X+Y*Y
      G=SQRT(G2)
      THET=ATAN2(Y,X)
      PHIT=ATAN2(Z,G)
C
C     IF MULTIPATH HAS BEEN SPECIFIED(IMUL=1) AND THE ELEVATION
C     ANGLE IS MEASURED BY RADAR(IOEM=3), COMPUTE THE ELEVATION
C     TRACKING BIAS(PBMP),VARIANCE(SP2MP),AND APPARENT TARGET
C     ALTITUDE(Z).
C
      SP2MP = 0.
      PBMP = 0.
      IF(IMUL.NE.1 .OR. IOEM.NE.3) GO TO 30
      CALL MULPTH(IRMP,REFC,PHIT,PBMP,SP2MP)
      PHIT = PHIT+PBMP
      Z = G*TAN(PHIT)
```

```
   30 CONTINUE
      R = SQRT(G2+Z*Z)
      RD=(X*VX+Y*VY+Z*VZ)/R
      TD=(X*VY-Y*VX)/G2
      PD=(VZ-Z*RD/R)/G
      IF(TIME.GT.TMIN) GO TO 58
      RDD = 0.0
      TDD = 0.0
      PDD = 0.0
      RANS=R
      THES=THET
      PHIS=PHIT
      ERAN2 = 0.0
      ERAN3 = 0.0
      ERAN4 = 0.0
      ETHE2 = 0.0
      ETHE3 = 0.0
      ETHE4 = 0.0
      EPHI2 = 0.0
      EPHI3 = 0.0
      EPHI4 = 0.0
      GO TO 59
   58 RDD=(RD-RDS)/.064
      TDD=(TD-TDS)/.064
      PDD=(PD-PDS)/.064
C
C     (STORE PREVIOUSLY OBSERVED MEAN TRACKING ERRORS FOR USE IN MEAN
C      TRACKING ERROR EQUATIONS)
C
   59 ERAN1=ERAN2
      ERAN2=ERAN3
      ERAN3=ERAN4
      ERAN4=R-RANS
      ERAN=ERAN1+.71875*(ERAN2-ERAN1)
      ETHE1=ETHE2
      ETHE2=ETHE3
      ETHE3=ETHE4
      ETHE4=(G/R)*ANGLIM(THET-THES)
      ETHE=ETHE1+.71875*(ETHE2-ETHE1)
      EPHI1=EPHI2
      EPHI2=EPHI3
      EPHI3=EPHI4
      EPHI4=PHIT-PHIS
      EPHI=EPHI1+.71875*(EPHI2-EPHI1)
C       CHECK  MASK  ANGLE
      IF(PHIT.LE.AMASK)    TFIRE= TIME+ TREACT+TTRACK
C
C     (SKIP FIRE ATTEMPT IF INSUFFICIENT TRACKING TC FIRE)
```

```
C
      IF(TIME.LE.TFIRE)GO TO 62
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
C                                                                 C
C               FFFFF   IIIII   RRRR    EEEEE                     C
C               F         I     R   R   E                         C
C               FFFF      I     RRRR    EEEE                      C
C               F         I     R  R    E                         C
C               F       IIIII   R   R   EEEEE                     C
C                                                                 C
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
      VG=SQRT(VX*VX+VY*VY)
      V =SQRT(VG*VG+VZ*VZ)
      PSI=ANGLIM(PFPA(INDEX1)+FRACT*ANGLIM(PFPA(INDEX2)-PFPA(INDEX1)))
C
C     (SKIP FIRE ATTEMPT IF MAX ALLOWED TRACKING ERROR IS EXCEEDED)
C
   54 IF(ABS(ETHE4).GT.ETMAX)GO TO 64
      IF(ABS(EPHI4).GT.EPMAX)GO TO 64
      IF(IOEM.GT.1)GO TO 56
C
C     (LIMIT INPUT RANGE ESTIMATE)
C
      RC=AMAX1(RMIN,AMIN1(RMAX,RANS-0.575*RD))
C
C     CCMPUTE MEAN ASSUMED TIME OF FIRE AIRCRAFT POSITION (MECHANICAL
C      COMPUTATION)
C
      XF=RC*CTBCPB-XG(IG)
      YF=RC*STBCPB-YG(IG)
      ZF=RC*SPB
      GF=SQRT(XF*XF+YF*YF)
      RF=SQRT(GF*GF+ZF*ZF)
C
C     (SET UP MATRIX T, THE TRANSFORMATION BETWEEN THE LINE OF SIGHT
C      SYSTEM AND THE FALSE HORIZON SYSTEM)
C
      T22 = X/G
      CT  = X/G
      ST=Y/G
      T33 = G/R
      CP  = G/R
      T13 = Z/R
      SP  = Z/R
      CS=COS(PSI)
      SS=SIN(PSI)
      CA=VG/V
      SA=VZ/V
```

```
      CG=VX/VG
      SG=VY/VG
      T11=CT*CP
      T12=ST*CP
      T21=-ST
      T31=-CT*SP
      T32=-ST*SP
C
C     (SET UP FALSE HORIZON SYSTEM VELOCITY COMPONENTS)
C
      VXP=T11*VX+T12*VY+T13*VZ
      VYP=T21*VX+T22*VY
      VZP=T31*VX+T32*VY+T33*VZ
      VGP=SQRT(VXP*VXP+VYP*VYP)
      CAP=VGP/V
      SAP=VZP/V
      CBP=VXP/VGP
      SBP=VYP/VGP
C
C     (SET UP UNIT VECTOR OUT LEFT WING OF AIRCRAFT)
C
      UX=-SA*CG*SS-SG*CS
      UY= CG*CS-SA*SG*SS
      UZ= CA*SS
      UZP=T31*UX+T32*UY+T33*UZ
      IF(VXP)31,32,31
   32 CSP=-T11*UX-T12*UY-T13*UZ
      GO TO 33
   31 CSP=(VGP*(T21*UX+T22*UY)+UZP*VZP*SBP)/VXP
   33 SSP=UZP/CAP
C
C     (COMPUTE FALSE HORIZON SYSTEM MEAN AND STANDARD DEVIATION OF
C      ERROR IN DIVE AND COURSE ANGLE ESTIMATES)
C
      EMAP=SAP*(.3196*ABS(CBP)-.1859*ABS(SBP))
      ESAP=.04712+.08063*ABS(SAP)*(1.0+1.16*ABS(CBP))
      EMBP=.4060*CAP*SBP*CBP
      ESBP=(.1670-.08098*ABS((CBP*CBP-SBP*SBP)*CSP)+
     1      .09006*ABS(SBP*SSP*CSP))/CAP
      SEMAP=SIN(EMAP)
      CEMAP=COS(EMAP)
      SEMBP=SIN(EMBP)
      CEMBP=COS(EMBP)
C     THE NEXT CARD ELIMINATES AN EQUIVALENCE BY USING A DOUBLE
C         REPLACEMENT.
      A33 = SAP*CEMAP + CAP*SEMAP
      SABP= SAP*CEMAP + CAP*SEMAP
      CABP=CAP*CEMAP-SAP*SEMAP
```

```
      SBBP=SBP*CEMBP+CBP*SEMBP
      CBBP=CBP*CEMBP-SBP*SEMB
C
C     (LIMIT VELOCITY ASSESSMENT (MECHANICAL COMPUTERS))
C
      VBP=AMIN1(VMAX,AMAX1(VMIN,V))
      ESVP=ESVPCT*V
C
C     SET UP THE ELEMENTS OF THE MATRIX A.
C     A CONTAINS THE PARTIALS OF VXE,VYE,VZE W.R.T. ALPHA,BETA,SPEED
C
      A31=CABP*CBBP
      A32=CABP*SBBP
      A21=-VBP*A32
      A22= VBP*A31
      A11=-VBP*SABP*CBBP
      A12=-VBP*SABP*SBBP
      A13= VBP*CABP
C
C     COMPUTE MEAN ESTIMATED VELOCITY COMPONENTS (MECHANICAL
C      COMPUTATION)
C
      VXE=(A31*T11+A32*T21+A33*T31)*VBP
      VYE=(A31*T12+A32*T22+A33*T32)*VBP
      VZE=(A31*T13        +A33*T33)*VBP
      GO TO 63
C
C     COMPUTE MEAN ASSUMED TIME OF FIRE AIRCRAFT POSITION (ELECTRONIC
C      COMPUTATION)
C
   56 XF=RANS*CTBCPB
      YF=RANS*STBCPB
      ZF=RANS*SPB
      GF=RANS*CPB
      RF=RANS
C
C  ITERATION TO DETERMINE MEAN THEORETICAL INTERCEPT POINT
C
   63 RS=0.0
      VS=VMUZZ
      T=0.0
   21 XE=XF+VXE*T
      YE=YF+VYE*T
      ZE=ZF+VZE*T
      XE2=XE*XE
      YE2=YE*YE
      ZE2=ZE*ZE
      GE2=XE2+YE2
```

```
      RE2=GE2+ZE2
      RE=SQRT(RE2)
      RC=RE-RS
      IF(RC.LT.1.0)GO TO 22
      VD=VS-(XE*VXE+YE*VYE+ZE*VZE)/RE
      IF(VD.LE.1.0)GO TO 64
      T=T+RC/VD
      IF(T.GT.TTFMAX)GO TO 64
      RS=RSHELL(T)
      VS = VSHELL(T)
      GC TO 21
   22 T2=T*T
C
C       CHANGE  22 JAN  76
C          IF INTERCEPT POINT BELOW MASK*****SKIP FIRE
C
      GE= SQRT(GE2)
      IF(ATAN2(ZE,GE).LE. AMASK)  GO  TO 64
C
C  ITERATION TO DETERMINE ACTUAL INTERCEPT POSITICN, RANGE, ANC TIME
C
      TU=AMIN1(TFMAX,TMAX-TIME)
   23 CALL RPLANE(TU)
      IF(RSHELL(TU).GT.RA)GO TO 24
C
C     (SKIP FIRE ATTEMPT IF SHELL CANNOT CATCH AIRCRAFT)
C
      IF((XA*GETVAL(VXFPA)+YA*GETVAL(VYFPA)+ZA*GETVAL(VZFPA))/RA .LT.
     1   VSHELL(TU))GO TC 64
      TU=TU-1.0
      IF(TU)64,64,23
   24 TL=0.0
   25 T=0.5*(TL+TU)
      CALL RPLANE(T)
      RC=RA-RSHELL(T)
      IF(RC.GT.1.0)GO TC 26
      IF(RC.GT.-1.0)GO TO 37
      TU=T
      GC TO 25
   26 TL=T
      GC TO 25
   37 CO=VS*RE-XE*VXE-YE*VYE-ZE*VZE
      Q1=(VZE-VS*ZE/RE)/Q0
      Q2=(XE*VYE-YE*VXE)/Q0
C
C     COMPUTE THE PARTIAL DERIVATIVES OF BIG THETA
C
      DTTDX=Q2*XE-YE
```

```
      DTTDY=Q2*YE+XE
      DTTDZ=Q2*ZE
      DTTDR=(ZF*DTTDZ+ YF*DTTDY+XF*DTTDX)/RF
      DTTDT=           XF*DTTDY-YF*DTTDX
      DTTDP= GF*DTTDZ-(YF*DTTDY+XF*DTTDX)*ZF/GF
C
C     COMPUTE THE PARTIAL DERIVATIVES OF BIG PHI
C
      DPPDX=Q1*XE
      DPPDY=Q1*YE
      DPPDZ=Q1*ZE+1.0
      DPPDR=(ZF*DPPDZ+ YF*DPPDY+XF*DPPDX)/RF
      DPPDT=           XF*DPPDY-YF*DPPDX
      DPPDP= GF*DPPDZ-(YF*DPPDY+XF*DPPDX)*ZF/GF
      GE4=GE2*GE2
      GC TO (210,220,230,240),IOEM
C
C  CCMPUTATIONS FCR MODE 1 OPERATION
C
  210 GO TO (211,212,213,214,215,999),IGT
C
C     TRACKING ERROR DISTRIBUTION SIZES (SPHERICAL COORDINATES)
C     (FOR GT 1, 2, OR 3)
C
  211 CONTINUE
  212 CONTINUE
  213 SR2=(123.0+0.0225*R)**2
      ST2=(.0643*TD)**2
      SP2=(.1320*PD)**2
      GO TO 219
C
C     (FOR GT 4 AND 5)
C
  214 CONTINUE
  215 SR2=(123.0+0.0225*R)**2
      ST2=(0.0167-.000710/(.0517+ABS(TD)))**2
      SP2=(0.0116-.000216/(.0235+ABS(ABS(PD)-4.0*PDD)))**2
C
C     SET UP THE ELEMENTS OF THE MATRIX B=AT
C
  219 B11=A11*T11+A12*T21+A13*T31
      B12=A11*T12+A12*T22+A13*T32
      B13=A11*T13           +A13*T33
      B21=A21*T11+A22*T21
      B22=A21*T12+A22*T22
      B23=A21*T13
      B31=A31*T11+A32*T21+A33*T31
      B32=A31*T12+A32*T22+A33*T32
```

```
      B33=A31*T13         +A33*T33
C
C     COMPUTE THE PARTIAL DERIVATIVES OF BIG THETA AND BIG PHI W.R.T.
C     ON CARRIAGE INPUTS (ALPHA, BETA, SPEED)
C
      DTTDAP=B11*DTTDX+B12*DTTDY+B13*DTTDZ
      DTTDBP=B21*DTTDX+B22*DTTDY+B23*DTTDZ
      DTTDVP=B31*DTTDX+B32*DTTDY+B33*DTTDZ
      DPPDAP=B11*DPPDX+B12*DPPDY+B13*DPPDZ
      DPPDBP=B21*DPPDX+B22*DPPDY+B23*DPPDZ
      DPPDVP=B31*DPPDX+B32*DPPDY+B33*DPPDZ
C
C     COMPUTE THE VARIANCES OF BIG THETA AND BIG PHI
C
      STT2=((DTTDR**2)*SR2  +(DTTDT**2)*ST2  +(DTTDP**2)*SP2
     1    +((DTTDAP*ESAP)**2+(DTTDBP*ESBP)**2+(DTTDVP*ESVP)**2)*T2)/GE4
      SPP2=((DPPDR**2)*SR2  +(DPPDT**2)*ST2  +(DPPDP**2)*SP2
     1    +((DPPDAP*ESAP)**2+(DPPDBP*ESBP)**2+(DPPDVP*ESVP)**2)*T2)/GE2
      GO TO 29
C
C    COMPUTATIONS FOR MODE 2, 3, OR 4 OPERATION
C
  220 GO TO (999,999,223,999,225,226),IGT
C
C     TRACKING ERROR DISTRIBUTIONS SIZES (SPHERICAL COORDINATES)
C     (FOR MODE 2)
C
  223 CONTINUE
  225 CONTINUE
  226 SR2=(41.0+0.0075*R)**2
      ST2=(.000982+.1681*TD*TD)**2
      SP2=(.000491+.033*ABS(ABS(PD)-4.0*PDD))**2
      GO TO 65
  230 GO TO (999,999,233,999,235,236),IGT
C
C     (FOR MODE 3)
C
  233 CONTINUE
  235 CONTINUE
  236 SR2=(17.0+0.24*ABS(RDD)+0.018*RDD*RDD)**2+SC2RJ
      ST2=(0.00196+0.050*TD)**2
      SP2=(0.000982+0.11*ABS(ABS(PD)-2.0*PDD))**2+SP2MP
      GO TO 65
  240 GO TO (999,999,243,999,245,246),IGT
C
C     (FOR MODE 4)
C
  243 CONTINUE
```

```
  245 CONTINUE
  246 SR2=(17.0+0.24*ABS(RDD)+0.018*RDD*RDD)**2+SD2RJ
      ST2=(0.000982+0.1681*TD*TD)**2
      SP2=(0.000491+0.033*ABS(ABS(PD)-4.0*PDD))**2+SP2MP
C
   65 RBTD=RANS*THESD
      RBPD=RANS*PHISD
C
C     VELOCITY COMPONENT ERROR DISTRIBUTION SIZES
C
      SVX2=(SR2*(PHISD*CTBSPB+THESD*STBCPB)**2
     1       +ST2*(RBPD*STBSPB-RBTD*CTBCPB-RANSD*STBCPB)**2
     2       +SP2*(RBPD*CTBCPB-RBTD*STBSPB+RANSD*CTBSPB)**2)*ATLCON
      SVY2=(SR2*(PHISD*STBSPB-THESD*CTBCPB)**2
     1       +ST2*(RBPD*CTBSPB+RBTD*STBCPB-RANSD*CTBCPB)**2
     2       +SP2*(RBPD*STBCPB+RBTD*CTBSPB+RANSD*STBSPB)**2)*ATLCON
      SVZ2=(SR2*(PHISD*CPB)**2+SP2*(RBPD*SPB-RANSD*CPB)**2)*ATLCON
C
C     COMPUTE THE VARIANCES OF BIG THETA AND BIG PHI
C
      STT2=((DTTDR**2)*SR2 +(DTTDT**2)*ST2 +(DTTDP**2)*SP2
     1     +((DTTDX**2)*SVX2+(DTTDY**2)*SVY2+(DTTDZ**2)*SVZ2)*T2)/GE4
     1+SD2J
      SPP2=((DPPDR**2)*SR2 +(DPPDT**2)*ST2 +(DPPDP**2)*SP2
     1     +((DPPDX**2)*SVX2+(DPPDY**2)*SVY2+(DPPDZ**2)*SVZ2)*T2)/GE2
     1+SD2J
C
C COMPUTATION OF VULNERABLE AREA OF AIRCRAFT AT INTERCEPT
C
   29 VP=VSHELL(T)
      XU=XE/RE
      YU=YE/RE
      ZU=ZE/RE
      XE=XU*RA
      YE=YU*RA
      ZE=ZU*RA
      GE=SQRT(XE*XE+YE*YE)
      VXA=GETVAL(VXFPA)
      VYA=GETVAL(VYFPA)
      VZA=GETVAL(VZFPA)
      VGA=SQRT(VXA*VXA+VYA*VYA)
      VA =SQRT(VGA*VGA+VZA*VZA)
      VXI=VP*XU-VXA
      VYI=VP*YU-VYA
      VZI=VP*ZU-VZA
      VI=SQRT(VXI*VXI+VYI*VYI+VZI*VZI)
      ALFA=GETVAL(AFPA)
      CA=COS(ALFA)
```

```
      SA=SIN(ALFA)
      BETA=BFPA(INDEX1)+FRACT*ANGLIM(BFPA(INDEX2)-BFPA(INDEX1))
      CG=COS(BETA)
      SG=SIN(BETA)
      PZI=PFPA(INDEX1)+FRACT*ANGLIM(PFPA(INDEX2)-PFPA(INDEX1))
C     THE NEXT CARDS ELIMINATE AN EQUIVALENCE BY USING A DOUBLE
C         REPLACEMENT.
      T33 = COS(PZI)
      CP  = COS(PZI)
      T13 = SIN(PZI)
      SP  = SIN(PZI)
      Q1=VXI*CG+VYI*SG
      Q2=VZI*CA-Q1*SA
      Q3=VYI*CG-VXI*SG
      VXF=Q1*CA+VZI*SA
      VYF=Q2*SP+Q3*CP
      VZF=Q2*CP-Q3*SP
C
C     (SET UP INDICES FCR VULNERABLE AREA INTERPOLATION)
C
      F1=ATAN2(VYF,VXF)/QTRPI
      IF(F1.LT.0.0)F1=F1+8.0
      I1=F1
      F1=F1-FLOAT(I1)
      I1=I1+1
      F2=ARCOS(VZF/VI)/QTRPI
      I2=F2
      F2=F2-FLOAT(I2)
      I2=I2+1
      F3=AMIN1(7.599999999,VI/152.4)
      I3=F3
      F3=F3-FLOAT(I3)
      I3=I3+1
      D1=1.0-F1
      D2=1.0-F2
      D3=1.0-F3
      J1=I1+1
      J2=I2+1
      J3=I3+1
C
C     (PERFORM LINEAR THREE DIMENSIONAL INTERPOLATICN)
C
      AVT=D3*(D2*(D1*VAT(I1,I2,I3)+F1*VAT(J1,I2,I3))+
     1          F2*(D1*VAT(I1,J2,I3)+F1*VAT(J1,J2,I3)))+
     2      F3*(D2*(D1*VAT(I1,I2,J3)+F1*VAT(J1,I2,J3))+
     3          F2*(D1*VAT(I1,J2,J3)+F1*VAT(J1,J2,J3)))
C
C  SET UP DISTRIBUTION SIZES OF OTHER SOURCES OF RANDOM ERROR
```

```
C
      SVA=XU*VXA+YU*VYA+ZU*VZA
      CVA2=VA*VA-SVA*SVA
      VMQ=.99*VMUZZ/RA-ASHCON
      DTI=(VMQ-SQRT(VMQ*VMQ-4.0*BSHCON))/(2.0*BSHCON)-T
      SLXMV2=CVA2*(DTI*VP/(VP-SVA/.99))**2
      SLYFR2=(0.010*VA*T)**2
      SLXFR2=SLYFR2*(1.0+CVA2/(VP-SVA)**2)
      SAOAP2=(0.003*RA)**2
      SAOGJ2=(0.005*RA)**2
      SAOBD2=(BDACON(IGT)*RA)**2
      IF(IOEM.EQ.1)GO TO 68
      SAOPE2=(0.002*RA)**2
      GO TO 67
   68 SAOPE2=(V*V-((X*VX+Y*VY+Z*VZ)/R)**2)*
     1         RA2*(0.0001463-7.478E-11*(R-1386.0)**2)**2
   67 CDIST=SAOAP2+SAOGJ2+SAOPE2+SAOBD2
C
C     COMBINE ALL ERRORS INTO ONE DISTRIBUTION, COMPUTE BIAS
C
      SXA2=STT2*RA2
      SYA2=SPP2*RA2
      SXL2=CDIST+SLXMV2+SLXFR2
      SYL2=CDIST+SLYFR2
      CTT=XE/GE
      STT=YE/GE
      CPP=GE/RE
      SPP=ZE/RE
      BXA=XA*STT-YA*CTT
      BYA=ZA*CPP-(YA*STT+XA*CTT)*SPP
      BXA2=BXA*BXA
      BYA2=BYA*BYA
      VAM=VXA*STT-VYA*CTT
      VAP=VZA*CPP-(VYA*STT+VXA*CTT)*SPP
      VAM2=VAM*VAM
      VAP2=VAP*VAP
      VAI2=VAM2+VAP2
      CD2=VAM2/VAI2
      SD2=VAP2/VAI2
      SXAT2=SXA2+CD2*SXL2+SD2*SYL2
      SYAT2=SYA2+CD2*SYL2+SD2*SXL2
      TWOCOV=2.0*VAM*VAP*(SXL2-SYL2)/VAI2
      DIF=SXAT2-SYAT2
      DEN=2.0*SQRT(TWOCOV*TWOCOV+DIF*DIF)
      HC2Z=DIF/DEN
      CZ2=0.5+HC2Z
      SZ2=0.5-HC2Z
      SZCZ=TWOCOV/DEN
```

```
      STUFF=2.0*SZCZ*BXA*BYA
      BXF2=CZ2*BXA2+SZ2*BYA2+STUFF
      BYF2=CZ2*BYA2+SZ2*BXA2-STUFF
      SXF2=CZ2*SXAT2+SZ2*SYAT2+SZCZ*TWOCOV
      SYF2=CZ2*SYAT2+SZ2*SXAT2-SZCZ*TWOCOV
      AVTPI=AVT/PI2
C
C     CCMPUTE PROBABILITY OF KILL
C
      STUFF=BXF2/(SXF2+AVTPI)+BYF2/(SYF2+AVTPI)
      IF(STUFF.LT.50.0)GO TO 75
      PK=0.0
      GO TO 78
   75 PK=AMIN1(1.0,EXP(-.5*STUFF)*AVTPI/SQRT((SXF2+AVTPI)*(SYF2+AVTPI)))
   78 PS=(1.0-PK)**ISB
      PK=1.0-PS
      TI=TIME+T
C
C     ACCUMULATE PK AS A FUNCTION OF INPUT TIME INTERVALS
C
      I=0
   50 I=I+1
      IF(TIME.GE.TINTER(I))GO TO 50
      J=I
   51 IF(TI.LT.TINTER(J))GO TO 52
      J=J+1
      GC TO 51
   52 PTOTTF(I)=PK+PS*PTOTTF(I)
      PTOTTI(J)=PK+PS*PTOTTI(J)
      CPS=CPS*PS
C
C     ACCUMULATE PK FOR EACH SPHERICAL SECTOR
C
      SPKT(I1,I2,I3)=PK+PS*SPKT(I1,I2,I3)
C
C     COMPUTE QUANTITIES FCR EXTENDED OUPUT,  WHEN CESIRED
C
      IF(IPRINT(6).LE.0)GO TO 20
      O1=THESD*DEGREE
      O2=PHISD*DEGREE
      O3=ETHE4*DEGREE
      C4=EPHI4*DEGREE
C     *****  ABS(BXF2,BYF2,SXF2,SYF2) WERE ADDED BELCW AS A TEMPORARY
C     *****  MEASURE TO PRECLUDE NEGATIVE ARGUMENTS FOR A SQRT FUNCTION.
C     *****  CAUSE OF NEGATIVE ARGUMENT: POSSIBLE ACCURACY DIFFERENCES
C     *****  BETWEEN THE CDC AND IBM TYPE COMPUTERS.
C     *****  CHANGE MADE BY LCDR C. SWENSON ON 3 MAR 1978.
      BXF2 = ABS(BXF2)
```

```
      O5=SQRT(BXF2+FUZZ)
      BYF2 = ABS(BYF2)
      O6=SQRT(BYF2+FUZZ)
      SXF2 = ABS(SXF2)
      O7=SQRT(SXF2)
      SYF2 = ABS(SYF2)
      O8=SQRT(SYF2)
      O9=1.0-CPS
C
C     WRITE EXTENDED OUTPUT
C
      CALL PAGES(1,5,JP)
      IF (JP.EQ.0) WRITE (6,1013) ISL,IGT,IEM,XGUN,YGUN,ZGUN,CIRCLE
      WRITE(6,1014)IG,IOEM,TIME,T,TI,R,RA,O7,O8,O5,O6,VI,O1,O2,O3,O4,
     1             AVT,PK,O9
   20 NROUND=NROUND+ISB
C
C  FIRE ADDITIONAL GUNS IN COMPLEX, IF ANY
C
   64 IG=IG+1
      IF(IG.GT.IGL)IG=1
      TFIRE=TFIRE+TPERS
      IF(TIME.GT.TFIRE)GO TO 54
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
C                                                            C
C             TTTTT RRRR    A    CCC  K   K                  C
C               T   R   R  A A  C   C K  K                   C
C               T   RRRR  A   A C     KKK                    C
C               T   R  R  AAAAA C   C K  K                   C
C               T   R   R A   A  CCC  K   K                  C
C                                                            C
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
   62 TIME=TIME+0.064
      IF(TIME.GT.TMAX)GO TO 69
C
C     SWITCH TO MODE 1 TRACKING IF JAMMING IS ABOVE THRESHOLD OR IF
C     RANGE IS TOO CLOSE
C
      IOEM = IEM
      SD2J = 0.
      SD2RJ = 0.
      IF(R.LT.RSMODE) GO TO 501
      IF(IJAM.EQ.0) GO TO 502
C
      CALL ECM2
C
      IF(SJT.GT.SJTMAX) GO TO 501
      IF(IOEM.EQ.3)CALL JAMER2(IRECM,SJT,SD2J)
```

```
      IF(IOEM.EQ.4) SD2RJ=SD2RJM
      IF(IRECM.EQ.3) SD2RJ = SD2RJM
      GO TO 502
  501 IOEM = 1
  502 CONTINUE
      IF(IJAM.EQ.0) GO TO 53
      IF(IP.EQ.0) GO TO 53
      IF( (ILOOP/IP)*IP.NE.ILOOP) GO TO 53
      DUM = 10.*ALOG10(GJ)
      WRITE(11,1044) TIME,R,XSEC,DUM,SJT,IOEM,SD2J,SD2RJ,SN
C
C   COMPUTE MEAN TRACKING ERRORS
C
   53 GO TO(310,320,330,340),IOEM
C
C     (MODE 1, GT 1 - 5)
C
  310 GO TO (311,312,313,314,315,999),IGT
  311 CONTINUE
  312 CONTINUE
  313 CONTINUE
  314 CONTINUE
  315 THESD=1.11*TD+0.9*TDD+6.0*ETHE
      PHISD=1.10*PD-0.7*PDD+6.0*EPHI
      RANSD=RD+3.0*ERAN
      GO TO 73
C
C     (MODE 2, GT 3, 5, AND 6)
C
  320 GO TO (999,999,323,999,325,326),IGT
  323 CONTINUE
  325 CONTINUE
  326 THESD=0.91*TD+0.45*TDD+6.0*ETHE
      PHISD=0.75*PD-0.25*PDD+6.0*EPHI
      RANSD=RD+3.0*ERAN
      GO TO 73
C
C     (MODE 3, GT 3, 5, AND 6)
C
  330 GO TO (999,999,333,999,335,336),IGT
  333 CONTINUE
  335 CONTINUE
  336 THESD=TD+6.0*ETHE
      PHISD=PD+6.0*EPHI
      RANSD = 0.804*RD + 3.0*ERAN
      GO TO 73
C
C     (MODE 4, GT 3, 5, AND 6)
```

```
C
  340 GO TO (999,999,343,999,345,346),IGT
  343 CONTINUE
  345 CONTINUE
  346 THESD=0.910*TD+0.45*TDD+6.0*ETHE
      PHISD=0.75*PD-0.25*PDD+6.0*EPHI
      RANSD = 0.804*RD + 3.0*ERAN
C
C     (LIMIT SLEW RATES AND ELEVATION ANGLE TO WEAPON MAXIMUMS)
C
   73 THESD=SIGN(AMIN1(TDMAX,ABS(THESD)),THESD)
      PHISD=SIGN(AMIN1(PDMAX,ABS(PHISD)),PHISD)
      THES=ANGLIM(THES+0.064*THESD)
      PHIS=AMAX1(PHMIN,AMIN1(PHMAX,PHIS+0.064*PHISD))
      RANS=AMAX1(0.0,RANS+0.064*RANSD)
      CTB=COS(THES)
      STB=SIN(THES)
      CPB=COS(PHIS)
      SPB=SIN(PHIS)
      CTBCPB=CTB*CPB
      CTBSPB=CTB*SPB
      STBCPB=STB*CPB
      STBSPB=STB*SPB
      RCS=RD
      TCS=TD
      PCS=PD
      IF(IEM.LT.2)GO TO 60
C
C     COMPUTE MEAN (SMOOTHED) VELOCITY COMPONENTS (ELECTRONIC
C      COMPUTATION)
C
      VXE=RANSD*CTBCPB-RANS*(STBCPB*THESD+CTBSPB*PHISD)
      VYE=RANSD*STBCPB+RANS*(CTBCPB*THESD-STBSPB*PHISD)
      VZE=RANSD*SPB+RANS*CPB*PHISD
      VXE=VXE+EMDTA*(VXES-VXE)
      VYE=VYE+EMDTA*(VYES-VYE)
      VZE=VZE+EMDTA*(VZES-VZE)
      VXES=VXE
      VYES=VYE
      VZES=VZE
      GO TO 60
 1013 FORMAT(' LOCATION',I5,6X,'GUN TYPE',I2,6X,'ERROR MODE',I2,6X,
     1'POSITION=(',F8.1,',',F8.1,',',F8.1,')   RADIUS=',F6.1,' M'/'OL
     2    FIRE    FLT.    INTCP    FIRE   INTCP',31X,'CLOSE    AZIM.   ELEV.
     3 MEAN    MEAN    VULN'/' N OEM  TIME    TIME     TIME   RANGE   RANGE
     4SIG1   SIG2    BIAS1   BIAS2     VEL.     RATE    RATE   AZ.ERR EL.ERR
     5AREA     SHOT PK     CUM.PK'/)
 1014 FORMAT(I2,I3,2F7.2,F8.2,2F7.0,1X,2F6.1,1X,2F7.1,F8.1,1X,2F7.2,1X,
```

```
     2     3F7.2,2F9.5)
1044 FORMAT(1X,F7.2,4X,F8.0,2X,F9.2,5X,F7.2,5X,F7.2,
    15X,I2,3X,E10.4,5X,E10.4,5X,F7.2)
  15 CALL S15    (TEMP,SPKT,SPKT2,&87,&95,&7777)
  69 CALL S69    (TEMP,SPKT,SPKT2,&87,&95,&7777)
 999 CALL S999   (TEMP,SPKT,SPKT2,&87,&95,&7777)
8888 CALL S8888  (TEMP,SPKT,SPKT2,&87,&95,&7777)
9994 CALL S9994  (TEMP,SPKT,SPKT2,&87,&95,&7777)
9995 CALL S9995  (TEMP,SPKT,SPKT2,&87,&95,&7777)
9996 CALL S9996  (TEMP,SPKT,SPKT2,&87,&95,&7777)
9997 CALL S9997  (TEMP,SPKT,SPKT2,&87,&95,&7777)
7777 CONTINUE
     END
C
C
C   SUBROUTINE TOOBIG WAS CONSTRUCTED FROM A PORTICN OF THE ORIGINAL P001
C   MAIN PROGRAM IN ORDER TO ENABLE PROPER COMPILATION OF THE MAIN.
C
      SUBROUTINE TOOBIG (TEMP,SPKT,SPKT2)
      COMMON/BLOCK1/ITITLE(20)
      COMMON/BLOCK2/NFPA,TMIN,TMAX,DTFPA
      COMMON/BLOCK3/XGUN,YGUN,ZGUN
      COMMON/BLOCK4/IGT,IEM,ICB,ISB,IGL,CIRCLE
      COMMON/BLOCK5/NRHOS,RHO(9)
      COMMON/BLOCK6/NTINTS,TINTER(10)
      COMMON/BLOCK7/IVACCM(20),VAT(9,5,9)
      COMMON/BLOCK8/TREACT,TRACK1,TRACK2
      COMMON/BLOCK9/TROUND(6),THDMAX(6),PHDMAX(6),PHIMIN(6),PHIMAX(6),
     1    VELMIN(6),VELMAX(6),RANMIN(6),RANMAX(6),
     2      ATLAG(6),ETHMAX(6),EPHMAX(6),RMODES(6)
      COMMON/BLOCKA/TFMAX1(6),TFMAX2(6),RVACON(6),RVBCON(6),VMUZEL(6)
      COMMON/CONSTS/DEGREE,RADIAN,PI,PI2,QTRPI,SQRT2
      COMMON/HEADFO/LINE,NUMBER
      COMMON/NFPARM/XA,YA,ZA,RA2,RA,TIME
      COMMON/IGXGYG/IG,XG(8),YG(8)
      COMMON/MAGIC /FRACT,INDEX1,INDEX2
      COMMON/VSASBS/VMUZZ,ASHCON,BSHCON,CQUAD
      COMMON/BUDGET/BDACON(6)
      COMMON/CECM1/IRECM,IJ,GAINJ,IX,XSEC,CALX,PJW,
     *         X,Y,Z,ROL,PIT,HDG,
     *          FTGT,FJAM,GJ,SJT,SN
      COMMON /NEWA/ VY1,VY,ALFA,J,IRMP,PLEN,O1,O8,D1,JJJ,XR,ZT,PZI,IERR
      COMMON /NEWB/ Y1,P2,VX,BETA,IF6,IMUL,IP,N,O7,D,TTRACK,KMODE,PSI,K
      COMMON /NEWC/ CP,X2,P1,B2,JFILE,IJAM,ISL,O4,CPS,TPERS,JMODE,YT,T2
      COMMON /NEWD/ T33,X1,Z2,B1,VX2,O3,CPK,NROUNC,IOFF,I,XT,TM,SP,T1
      COMMON /NEWE/ Z1,A2,VX1,VZ2,PHI,IF5,IEOF,YR,IF2,T13,IFILE,Y2,A1
      COMMON /NEWF/ V2,VZ1,V,FUZZ,IF9,SD2RJ,SD2RJM,V1,VY2,F,JP,IF7,REFC
      COMMON /NEWG/ SJTMAX,O2,PK,D2,ISW
```

```
      CCMMON XFPA(1201),YFPA(1201),ZFPA(1201),BFPA(1201),AFPA(1201),
     1       PFPA(1201),VXFPA(1201),VYFPA(1201),VZFPA(1201)
      CCMMON ICARD(20),PTOTTF(10),PTOTTI(10)
      CCMMON SPKTCT(32,8),IPRINT(6),IFLAGS(4)
      CCMMON    PKTTDC(9),PKTIDC(10,9),PKTFDC(10,9)
      CCMMON INUNIT
      DIMENSION TEMP(16,6),SPKT(8,4,8),SPKT2(32,8)
C
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
C                                                                      C
C               IIIII  N   N  PPPP   U   U  TTTTT                      C
C                 I    NN  N  P   P  U   U    T                        C
C                 I    N N N  PPPP   U   U    T                        C
C                 I    N  NN  P      U   U    T                        C
C               IIIII  N   N  P       UUU     T                        C
C                                                                      C
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
      ENTRY S8888 (TEMP,SPKT,SPKT2,*,*,*)
      ASSIGN 9997 TO IEOF
      GC TO 15
   12 ASSIGN 9999 TO IEOF
      ENTRY S15   (TEMP,SPKT,SPKT2,*,*,*)
   15 READ(INUNIT,1007,ERR=9992,END=9993)I,ICARD
      IF(I.LE.0 .OR. I.GT.14) GO TO 9998
      GO TO (101,102,103,104,105,106,107,108,109,110,111,112
     1,113,114),I
C
C  DECODE DATA BLOCK 01 -- HEADER INFORMATION
C     XROA VERSION ALLOWS ONLY 70 SPACES FOR TITLE.
C
  101 DC 17 I=1,20
   17 ITITLE(I)=ICARD(I)
      GC TO 15
C
C  DECODE DATA BLOCK 02 -- FLIGHT PATH INPUT, TRANSLATION, ROTATION,
C                          AND INTERPCLATION
C     SUGGEST SECTION ON TAPE9 BE RE-WRITTEN FOR COMPATIBILITY WITH
C         ASD FLIGHT PATH PROGRAMS.  SEE P-1127, FOR EXAMPLE.
C
  102   READ (99,1028)      JMODE,KMODE,TMIN,TMAX,CTFPA,XR,YR,XT,YT,PSI,
     1 ZT
C     THIS CARD WAS ADDED
      IF2=1
      TMAX=TMAX-TMIN
      TM=0.0
      T2=-1.0
      NFPA=0
      K=0
```

```
      PZI=PSI*RADIAN
      T13 = SIN(PZI)
      SP = SIN(PZI)
      T33 = COS(PZI)
      CP = COS(PZI)
      LINE=66
      IF(JMODE)5,5,1
    1 ASSIGN 4 TO IEOF
      ASSIGN 3 TO IERR
      IF(JMODE.GT.IFILE)GO TO 2
      REWIND 9
      IFILE=1
      GO TO 4
    2 IFILE=IFILE+1
    3 READ(9,ERR=9992,END=9993)
      GO TO 3
    4 IF(JMODE.GT.IFILE)GO TO 2
      ASSIGN 9999 TO IECF
      ASSIGN 28 TO IERR
      READ(9,ERR=9992,END=9993)
   28 ASSIGN 9996 TO IERR
      JMODE=6
    5 T1=T2
      X1=X2
      Y1=Y2
      Z1=Z2
      P1=P2
      A1=A2
      B1=B2
      V1=V2
      VX1=VX2
      VY1=VY2
      VZ1=VZ2
      IF(JMODE)6,6,7
    6 READ(INUNIT,1000,ERR=9992,END=9993)T2,X,Y,Z,VX,VY,VZ2,B2,A2,P2
      B2=B2*RADIAN
      A2=A2*RADIAN
      P2=P2*RADIAN
      V2=SQRT(VX*VX+VY*VY+VZ2*VZ2)
      GO TO 9
    7 JMODE=JMODE+1
      IF(JMODE.LE.6)GO TO 8
      JMODE=1
      READ(9,ERR=9992,END=9993)TEMP
    8 T2 =TEMP( 1,JMODE)
      X  =TEMP( 2,JMODE)
      Y  =TEMP( 3,JMODE)
      Z  =TEMP( 4,JMODE)
```

```
      VX =TEMP( 5,JMODE)
      VY =TEMP( 6,JMODE)
      VZ2=TEMP( 7,JMODE)
      V2 =TEMP(11,JMODE)
      B2 =TEMP(13,JMODE)
      A2 =TEMP(14,JMODE)
      P2 =TEMP(15,JMODE)
    9 X2=XT+(X-XR)*CP+(Y-YR)*SP
      Y2=YT+(Y-YR)*CP-(X-XR)*SP
      Z2=ZT+Z
      VX2=VX*CP+VY*SP
      VY2=VY*CP-VX*SP
      B2=ANGLIM(B2-PZI)
      T2=T2-TMIN
   10 IF(TM.GT.T2)GO TO 5
      F=(TM-T1)/(T2-T1)
      NFPA=NFPA+1
      XFPA(NFPA)=X1+F*(X2-X1)
      YFPA(NFPA)=Y1+F*(Y2-Y1)
      ZFPA(NFPA)=Z1+F*(Z2-Z1)
      VXFPA(NFPA)=VX1+F*(VX2-VX1)
      VYFPA(NFPA)=VY1+F*(VY2-VY1)
      VZFPA(NFPA)=VZ1+F*(VZ2-VZ1)
      V=V1+F*(V2-V1)
      BFPA(NFPA)=ANGLIM(B1+F*ANGLIM(B2-B1))
      AFPA(NFPA)=A1+F*(A2-A1)
      PFPA(NFPA)=ANGLIM(P1+F*ANGLIM(P2-P1))
      K=K-1
      IF(K)34,34,35
   34 K=KMODE
      PHI=DEGREE*PFPA(NFPA)
      BETA=DEGREE*BFPA(NFPA)
      ALFA=DEGREE*AFPA(NFPA)
      CALL PAGES(1,2,JP)
      IF (JP.EQ.0) WRITE (6,1003)
      WRITE(6,1004)TM,XFPA(NFPA),YFPA(NFPA),ZFPA(NFPA),
     1             V,VXFPA(NFPA),VYFPA(NFPA),VZFPA(NFPA),BETA,ALFA,PHI
   35 TM=DTFPA*FLOAT(NFPA)
      IF(TM.LE.TMAX)GO TO 10
      TMAX=TM-DTFPA-FUZZ
      CALL PAGES(4,0,JP)
      WRITE(6,1005)XR,YR,XT,YT,PSI,ZT
      CALL TPLOT(NFPA)
      IF(JMODE.GT.0 .OR. INUNIT.EQ.8)GO TO 12
      ASSIGN 12 TO IEOF
   13 READ(INUNIT,1000,ERR=9992,END=9993)
      GO TO 13
C
```

```
C   DECODE DATA BLOCK 03 -- WEAPON LOCATION
C
  103   READ (99,1008)       XGUN,YGUN,ZGUN
      GO TO 12
C
C   DECODE DATA BLOCK 04 -- WEAPON TYPE, MODE, NUMBER OF BARRELS (CYCLIC
C                            AND SIMULTANEOUS), NUMBER OF WEAPONS PER
C                            LOCATION, RADIUS OF CIRCLE OF WEAPON COMPLEX
C
  104   READ (99,1009)       IGT,IEM,ICB,ISB,IGL,CIRCLE
      IF(IGL-1)9998,61,66
   61 XG(1)=0.0
      YG(1)=0.0
      GO TO 12
   66 DO 16 I=1,IGL
      F=PI2*FLOAT(I)/FLOAT(IGL)
      XG(I)=CIRCLE*COS(F)
   16 YG(I)=CIRCLE*SIN(F)
      GO TO 12
C
C   DECODE DATA BLOCK 05 -- WEAPON DENSITY FACTORS
C
  105   READ (99,1015)       IF5,NRHOS,(RHO(I),I=1,NRHOS)
      GO TO 12
C
C   DECODE DATA BLOCK 06 -- PK ACCRUAL TIME INTERVALS
C
  106   READ (99,1015)       IF6,NTINTS,(TINTER(I),I=1,NTINTS)
      NTINTS=NTINTS+1
      TINTER(NTINTS)=999.99
      GO TO 12
C
C   DECODE DATA BLOCK 07 -- AIRCRAFT VULNERABLE AREAS
C
  107 DO 11 I=1,20
   11 IVACOM(I)=ICARD(I)
      READ(INUNIT,1000,ERR=9992,END=9993)(VAT(1,1,K),K=2,9)
      DO 88 J=2,4
      DO 89 I=1,8
      READ(INUNIT,1000,ERR=9992,END=9993)(VAT(I,J,K),K=2,9)
   89 CONTINUE
      DO 88 K=2,9
   88 VAT(9,J,K)=VAT(1,J,K)
      READ(INUNIT,1000,ERR=9992,END=9993)(VAT(1,5,K),K=2,9)
      DO 18 K=2,9
      DO 18 I=2,9
      VAT(I,5,K)=VAT(1,5,K)
   18 VAT(I,1,K)=VAT(1,1,K)
```

```
      IF7=1
      GO TO 12
C
C  DECODE DATA BLOCK 08 -- WEAPON REACTICN AND TRACK TIMES
C
 108   READ (99,1008)      TREACT,TRACK1,TRACK2
      GO TO 12
C
C  DECOCE DATA BLOCK 09 -- WEAPON PARAMETERS
C
 109   READ (99,1008)      TROUND(IGT),THDMAX(IGT),PHDMAX(IGT),
     1           PHIMIN(IGT),PHIMAX(IGT),VELMIN(IGT),VELMAX(IGT),
     2           RANMIN(IGT),RANMAX(IGT)
      READ(INUNIT,1000,ERR=9992,END=9993)ATLAG(IGT),ETHMAX(IGT),
     1   EPHMAX(IGT),RMODES(IGT)
      IF9=1
      GC TO 12
C
C  CECODE DATA BLOCK 10 -- SHELL PARAMETERS
C
 110   READ (99,1008)      TFMAX1(IGT),TFMAX2(IGT),RVACON(IGT),
     1           RVBCON(IGT),VMUZEL(IGT)
      IF9=1
      GO TO 12
C
C  DECOCE DATA BLOCK 11 -- INPUT OPTION (CARD/TAPE)
C
 111   READ (99,1028)     I
      IF(I)81,81,82
  81  INUNIT=5
      GO TO 15
  82  INUNIT=8
      ASSIGN 83 TO IEOF
      IF(I.GT.JFILE)GO TO 84
      REWIND 8
      JFILE=1
  83  IF(I-JFILE)12,12,84
  84  JFILE=JFILE+1
  85  READ(8,1000,ERR=9992,END=83)
      GC TO 85
C
C     DECODE DATA BLOCK 13  --- LOW ALTITUDE RADAR MULTIPATH EFFECT
C
 113   READ (99,1038)       IMUL,IRMP,REFC
      IF(IMUL.EQ.0) GO TO 12
      CALL PAGES(12,0,JP)
      WRITE(6,1098) IRMP,REFC
1098  FORMAT(///,' MULTIPATH INPUTS (INITIAL OR CHANGED ',//,
```

```
     0' IRMP =       ',I5,/,
     1' REFC =       ',F6.3,////)
      GC TO 12
C
C     DECODE DATA BLOCK 14 --- ECM
C
  114 SC2RJ = 0.
      SD2RJ = 0.
         READ (99,1041)       IJAM,IP,IJ,GAINJ,PJW,PLEN,IX,XSEC,CALX,
     *                       IRECM,SJTMAX
      IF(IJAM.EQ.0) GO TO 12
      CALL PAGES(28,0,JP)
      WRITE(6,1096) IP,IJ,GAINJ,PJW,PLEN,IX,XSEC,CALX,IRECM,SJTMAX
 1096 FORMAT(///,' ECM INPUTS (INITIAL CR CHANGED) ',//,
     0' IP =         ',I5,/,
     1' IJ =         ',I5,/,
     2' GAINJ(DB) =',F7.2,/,
     3' PJW(W) =    ',F9.2,/,
     4' PLEN(S) =   ',E12.6,/,
     5' IX =         ',I5,/,
     6' XSEC(SQM) =',F10.3,/,
     7' CALX =       ',F10.3,/,
     8' IRECM =      ',I5,/,
     9' SJTMAX(DB) =',F7.2,////)
      CALL ECM1
      IF(IRECM.EQ.3) CALL JAMER1(PLEN,SC2RJM)
      IF(IEM.EQ.4) CALL JAMER1(PLEN,SD2RJM)
      GO TO 12
C
C   DECODE DATA BLOCK 12 -- PRINT OPTIONS FOR OUTPUT FORMAT - ALSO
C                           SIGNALS FOR RUN TO BEGIN
C
  112    READ (99,1016)      IPRINT
C
C   PRINT DATA BLOCKS 6, 7, 9, AND 10 (IF THEY CHANGE)
C      "IF2" IS USED TO SET LINE COUNT TC PROPER VALUE.  INPUT AND
C          OUTPUT PRINT OUT START A NEW PAGE FOR EACH "12" CARD.
C
      IF (IF2.EQ.0) LINE = 66
      IF2=0
      IF(IJAM.EQ.0) GO TO 48
      IF(IP.EQ.0) GO TO 48
      WRITE(11,1043) ITITLE
      WRITE(11,1042)
      WRITE(11,1001) ISL,IGT,IEM,XGUN,YGUN,ZGUN,CIRCLE
      WRITE(11,1045)
   48 CCNTINUE
      IF(IF5.EQ.0)GO TO 97
```

```
      CALL PAGES(5,0,JP)
      WRITE(6,1029)NRHOS,(RHO(I),I=1,NRHOS)
      IF5=0
   97 IF(IF6.EQ.0)GO TO 98
      CALL PAGES(5,0,JP)
      WRITE(6,1011)NTINTS,(TINTER(I),I=1,NTINTS)
      IF6=0
   98 IF(IF7.EQ.0)GO TO 99
      CALL PAGES(7,0,JP)
      WRITE(6,1010) IVACOM
      DO 19 N=1,26
      J=(N+14)/8
      I=15+N-J*8
      CALL PAGES(1,7,JP)
      IF (JP.EQ.0) WRITE (6,1010) IVACOM
   19 WRITE(6,1026)N,(VAT(I,J,K),K=2,9)
      IF7=0
   99 IF(IF9.EQ.0)GO TO 87
      CALL PAGES(10,0,JP)
      WRITE(6,1025)
      DO 86 I=1,6
      O1=PHIMIN(I)*DEGREE
      O2=PHIMAX(I)*DEGREE
      O3=THDMAX(I)*DEGREE
      O4=PHDMAX(I)*DEGREE
      O7=ETHMAX(I)*DEGREE
      O8=EPHMAX(I)*DEGREE
   86 WRITE(6,1012)I,TROUND(I),O1,O2,O3,O4,TFMAX1(I),TFMAX2(I),VMUZEL(I)
     1,RVACON(I),RVBCON(I),VELMIN(I),VELMAX(I),RANMIN(I),RANMAX(I)
     2,ATLAG(I),O7,O8
      IF9=0
      RETURN 1
 1000 FORMAT(10E8.0)
 1001 FORMAT(' LOCATION',I5,6X,'GUN TYPE',I2,6X,'ERROR MODE',I2,9X,
     1 'POSITION=(',F7.0,',',F7.0,',',F7.0,')   RADIUS=',F5.0,'M'/)
 1003 FORMAT(3X'TIME',14X'XXX',7X'YYY',7X'ZZZ',12X'SPEED',6X'XDOT',
     1      6X'YDOT',6X'ZDOT',10X'HEADING',5X'CLIMB',6X'ROLL'/)
 1004 FORMAT(1X,F6.2,7X,3F10.1,7X,4F10.2,7X,3F10.2)
 1005 FORMAT(//'OXR=',F9.2,'    YR=',F9.2,8X,'XT=',F9.2,'    YT=',F9.2,8X,
     1'PSI=',F7.2,8X,'DZ=',F9.2)
 1007 FORMAT(I2,19A4,A2)
 1008 FORMAT(8X,9E8.0)
 1009 FORMAT(3X,5I1,E8.0)
 1010 FORMAT('-VULNERABLE AREA (SQ. METERS) AS A FUNCTION OF IMPACT ',
     1     'SPEED (METERS/SEC) AND ASPECT VIEW'/5X,20A4//' VIEW',7X'0
     2 152      305      457      610      762      914     1067     1219'/)
 1011 FORMAT(1H-,I2,' TIME INTERVALS FOR PK ACCUMULATION'//4X'0.00',
     1     10F8.2)
```

```
1012 FORMAT(I2,F7.3,3F7.2,3F6.2,F6.0,2F12.7,2F6.1,2F7.0,F8.2,2F8.3)
1015 FORMAT(5X,I1,1X,I1,9E8.0)
1016 FORMAT(2X,6I1)
1025 FORMAT('0G   TIME/      MIN     MAX    AZIM   ELEV    MAX    MAX  MUZZ    B
    2ALLISTIC   BALLISTIC    VEL     VEL   RANGE   RANGE  SMOOTH  MAX.AZ   MA
    3X.EL'/ ' T  ROUND     ELEV    ELEV    RATE   RATE   TOF1   TOF2    VEL   CO
    4NSTANT 1   CONSTANT 2    MIN     MAX     MIN     MAX    CONST    ERROR   E
    5RROR'/)
1026 FORMAT(I5,4X,'0.00',8F8.2)
1028 FORMAT(2X,I4,I2,9E8.0)
1029 FORMAT(1H-,I1,' DENSITY CLASSES FOR PK ACCUMULATION'//9F12.5)
1038 FORMAT(2X,I3,I5,F10.0)
1041 FORMAT(2X,I3,I3,I2,3F10.0,I5,2F10.0,I5,F10.0)
1042 FORMAT(//,' ECM VARIABLES')
1043 FORMAT('1AAASIM----',10A10)
1045 FORMAT(//,
    1'   FIRE TIME  RANGE(M)    X-SEC(SQM)   JAM.GAIN(DB)   J/S(DB)',
    2'   MODE  ADD.TRK.VAR.  ADD.RNG.VAR.      S/N(DB)')
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
C                                                                         C
C                  OOO    U    U  TTTTT   PPPP    U    U  TTTTT           C
C                 O   O   U    U    T     P   P   U    U    T             C
C                 O   O   U    U    T     PPPP    U    U    T             C
C                 O   O   U    U    T     P       U    U    T             C
C                  OOO     UUU      T     P        UUU      T             C
C                                                                         C
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
      ENTRY S69     (TEMP,SPKT,SPKT2,*,*,*)
   69 DO 92 I=1,4
   92 IFLAGS(I)=IFLAGS(I)+IPRINT(I)
C
C  PRINT PK AS A FUNCTION OF AIRCRAFT ASPECT AND IMPACT SPEED
C
      IF(IPRINT(5).EQ.0)GO TO 80
      CALL PRSEGS(SPKT2,ISL)
C
C  COMPUTE PK AS A FUNCTION OF ASPECT AND IMPACT SPEED FOR ALL GUNS
C
   80 DO 36 I=1,32
      DO 36 J=1,8
      PK=RHO(1)*SPKT2(I,J)
   36 SPKTOT(I,J)=PK+(1.0-PK)*SPKTOT(I,J)
C
C  STORAGE OF PK VS DENSITY FACTOR AND TIME INTERVALS (AT FIRE AND
C     INTERCEPT) PER WEAPON OR WEAPON COMPLEX
C
      CPK=1.0-CPS
      DO 55 I=1,NRHOS
```

```
      D=RHO(I)
      PK=D*CPK
      PKTTDC(I)=PK+(1.0-PK)*PKTTDC(I)
      DC 55 J=1,NTINTS
      D1=D*PTOTTF(J)
      PKTFDC(J,I)=D1+(1.0-D1)*PKTFDC(J,I)
      D2=D*PTOTTI(J)
   55 PKTIDC(J,I)=D2+(1.0-D2)*PKTIDC(J,I)
C
C     COMPUTE, STORE, AND WRITE TOTAL PKS FOR ENTIRE ARRAY OF WEAPONS
C
      F=FLOAT(NROUND/ISB)*TPERS
      WRITE(7)ISL,IGT,IEM,ICB,ISB,IGL,XGUN,YGUN,ZGUN,TREACT,TTRACK,
     1 CIRCLE,NROUND,F,CPK,NRHOS,RHO,NTINTS,TINTER,PTOTTF,PTOTTI,IPRINT
      ISL=ISL+1
      ASSIGN 70 TC IEOF
      GC TO 15
   70 ENDFILE 7
      LINE=66
      REWIND 7
C     PUNCH2 CARDS WRITE ONLY ONE CARD IMAGE ON TAPE4 WHEN THERE IS
C        ONLY ONE DEFENSE PER EMPLOYMENT (I.E., ONLY ONE "12" CARD
C        BEFORE 7/8/9 END-OF-RECORD).
      K = ISL
      CALL PAGES(4,0,JP)
      WRITE (6,1033)
      ASSIGN 40 TO IEOF
   79 READ(7,ERR=9992,END=9993)ISL,IGT,IEM,ICB,ISB,IGL,XGUN,YGUN,ZGUN,
     1   TREACT,TTRACK,
     1 CIRCLE,NROUND,F,CPK,NRHOS,RHO,NTINTS,TINTER,PTOTTF,PTOTTI,IPRINT
      CALL PAGES(1,4,JP)
      IF (JP.EQ.0) WRITE (6,1033)
      WRITE (6,1034) ISL,CPK,NROUND,F,XGUN,YGUN,ZGUN,CIRCLE,IGL,
     1     TREACT,TTRACK,IGT,IEM,ICB,ISB,ISL
      WRITE (4,1060) ITITLE(9),ITITLE(10),ISL,IGT,IEM,ICB,ISB,IGL,CPK,
     1     NROUND,XGUN,YGUN,ZGUN,F,NUMBER
      GC TO 79
   40 IF (K.NE.2) WRITE (4,1064) ITITLE(9),ITITLE(10),PKTTDC(1),NUMBER
      IF (IFLAGS(2).LE.0) GO TO 76
      REWIND 7
      CALL PAGES(4,0,JP)
      WRITE (6,1031) (I,I=1,10)
   77 READ(7) ISL,IGT,IEM,ICB,ISB,IGL,XGUN,YGUN,ZGUN,TREACT,TTRACK,
     1 CIRCLE,NROUND,F,CPK,NRHOS,RHO,NTINTS,TINTER,PTOTTF,PTOTTI,IPRINT
      IF(IPRINT(2).LE.0)GO TO 77
      CALL PAGES(1,4,JP)
      IF (JP.EQ.0) WRITE (6,1031) (I,I=1,10)
      WRITE(6,1032)ISL,(TINTER(I),I=1,NTINTS)
```

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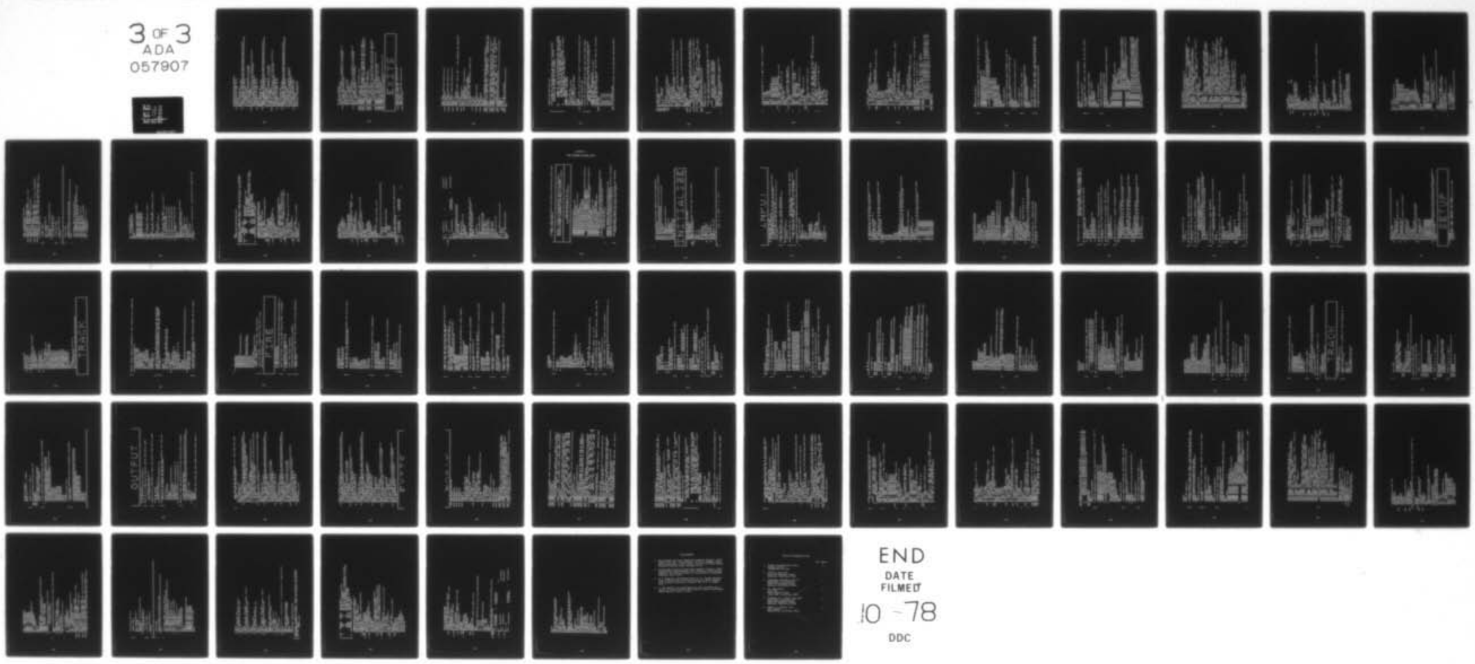

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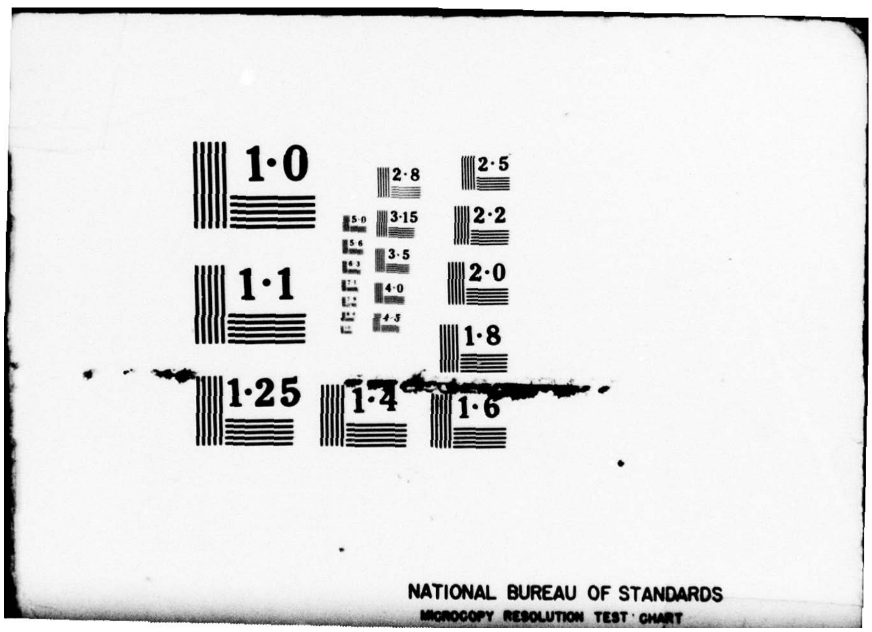
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NATIONAL BUREAU OF STANDARDS
MICROCOPY RESOLUTION TEST CHART

```
      IFLAGS(2)=IFLAGS(2)-IPRINT(2)
      IF(IFLAGS(2).GT.0)GO TO 77
   76 IF(IFLAGS(3).LE.0)GO TO 42
      REWIND 7
      CALL PAGES(4,0,JP)
      WRITE (6,1035) (I,I=1,10)
   41 READ(7) ISL,IGT,IEM,ICB,ISB,IGL,XGUN,YGUN,ZGUN,TREACT,TTRACK,
     1 CIRCLE,NROUND,F,CPK,NRHOS,RHO,NTINTS,TINTER,PTOTTF,PTOTTI,IPRINT
      IF(IPRINT(3).LE.0)GO TO 41
      CALL PAGES(2,4,JP)
      IF (JP.EQ.0) WRITE (6,1035) (I,I=1,10)
      WRITE(6,1018)ISL,(PTOTTF(I),I=1,NTINTS)
      DO 410 I=2,NTINTS
  410 PTOTTF(I) = PTOTTF(I-1) + (1.0-PTOTTF(I-1))*PTOTTF(I)
      WRITE (6,1058) ISL,(PTOTTF(I),I=2,NTINTS)
      IFLAGS(3)=IFLAGS(3)-IPRINT(3)
      IF(IFLAGS(3).GT.0)GO TO 41
   42 IF(IFLAGS(4).LE.0)GO TO 71
      REWIND 7
      CALL PAGES(4,0,JP)
      WRITE (6,1036) (I,I=1,10)
   43 READ(7) ISL,IGT,IEM,ICB,ISB,IGL,XGUN,YGUN,ZGUN,TREACT,TTRACK,
     1 CIRCLE,NROUND,F,CPK,NRHOS,RHO,NTINTS,TINTER,PTOTTF,PTOTTI,IPRINT
      IF(IPRINT(4).LE.0) GO TO 43
      CALL PAGES(2,4,JP)
      IF (JP.EQ.0) WRITE (6,1036) (I,I=1,10)
      WRITE(6,1018)ISL,(PTOTTI(I),I=1,NTINTS)
      DO 430 I=2,NTINTS
  430 PTOTTI(I) = PTOTTI(I-1) + (1.0-PTOTTI(I-1))*PTOTTI(I)
      WRITE (6,1058) ISL,(PTOTTI(I),I=2,NTINTS)
      IFLAGS(4)=IFLAGS(4)-IPRINT(4)
      IF(IFLAGS(4).GT.0)GO TO 43
   71 IF(IFLAGS(1).LE.0)GO TO 44
      REWIND 7
      CALL PAGES(4,0,JP)
      WRITE (6,1017) (I,I=1,9)
   74 READ(7) ISL,IGT,IEM,ICB,ISB,IGL,XGUN,YGUN,ZGUN,TREACT,TTRACK,
     1 CIRCLE,NROUND,F,CPK,NRHOS,RHO,NTINTS,TINTER,PTOTTF,PTOTTI,IPRINT
      IF(IPRINT(1).LE.0)GO TO 74
      CALL PAGES(1,4,JP)
      IF (JP.EQ.0) WRITE (6,1017) (I,I=1,9)
      WRITE(6,1059)ISL,(RHO(I),I=1,NRHOS)
      IFLAGS(1)=IFLAGS(1)-IPRINT(1)
      IF(IFLAGS(1).GT.0)GO TO 74
   44 CALL PAGES(7+NTINTS,0,JP)
      WRITE(6,1019)
      WRITE (6,1021) (I,I=1,9)
      PTOTTF(1) = PKTFDC(1,1)
```

```
      DC 440 I=1,NTINTS
      IF (I.EQ.1) GO TO 440
      PTOTTF(I) = PTOTTF(I-1) + (1.0-PTCTTF(I-1))*PKTFDC(I,1)
  440 WRITE (6,1018) I,PTOTTF(I),(PKTFDC(I,J),J=1,NRHOS)
      CALL PAGES (9+NTINTS,0,JP)
      WRITE(6,1020)
      WRITE (6,1021) (I,I=1,9)
      PTOTTI(1) = PKTIDC(1,1)
      DO 441 I=1,NTINTS
      IF (I.EQ.1) GO TO 441
      PTOTTI(I) = PTOTTI(I-1) + (1.0-PTOTTI(I-1))*PKTIDC(I,1)
  441 WRITE (6,1018) I,PTOTTI(I),(PKTIDC(I,J),J=1,NRHOS)
      WRITE (6,1023) (PKTTDC(I),I=1,NRHOS)
      CALL PRSEGS(SPKTOT,0)
      GO TO 95
 1017 FORMAT('- LOC',12X,9(7X'RHO',I2)/)
 1018 FORMAT(I5,10F12.7)
 1019 FORMAT('-ATTRITION ACCRUED AS A FUNCTION OF TIME OF FIRE')
 1020 FORMAT('-ATTRITION ACCRUED AS A FUNCTION OF TIME AT INTERCEPT')
 1021 FORMAT('OTIME',5X'CUM FOR',9(5X'DENSITY')/' SEG.',5X'CLASS 1',
     1      9(5X'CLASS',I2)/)
 1023 FORMAT(1H0,10X,'TOTALS',9F12.7)
 1031 FORMAT('- LOC',10(6X,'TIME',I2)/)
 1032 FORMAT(I5,10F12.2)
 1033 FORMAT('- LOC',5X'P(KILL)',6X'ROUNDS',3X'FIRE TIME',8X'XGUN',
     1      8X'YGUN',8X'ZGUN   RADIUS GL',5X'T REACT',5X'T TRACK',
     2      ' GT EM CB SB  LOC')
 1034 FORMAT(I5,F12.7,I12,4F12.2,F9.2,I3,2F12.2,4I3,I5)
 1035 FORMAT('- LOC',10(4X,'PK(TF',I2,')')/)
 1036 FORMAT('- LOC',10(4X,'PK(TI',I2,')')/)
 1058 FORMAT(I5,'CUM',9X,9F12.7)
 1059 FORMAT(I5,12X,9F12.5)
 1060 FORMAT(2A9,I3,5I2,F10.7,I5,2F7.0,F6.0,F6.1,I6)
 1064 FORMAT(2A9,13X,F10.7,31X,I6)
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
C                                                                 C
C              EEEEE  X   X  IIIII  TTTTT   SSSS                  C
C              E       X X     I      T    S                      C
C              EEE      X      I      T     SSS                   C
C              E       X X     I      T        S                  C
C              EEEEE  X   X  IIIII    T    SSSS                   C
C                                                                 C
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
      ENTRY S999  (TEMP,SPKT,SPKT2,*,*,*)
  999 WRITE(6,1027)IGT,IEM
      CALL EXIT
      ENTRY S9994 (TEMP,SPKT,SPKT2,*,*,*)
 9994 WRITE(6,1040)
```

```
      CALL EXIT
      ENTRY S9995 (TEMP,SPKT,SPKT2,*,*,*)
 9995 WRITE(6,1039)
      CALL EXIT
      ENTRY S9996 (TEMP,SPKT,SPKT2,*,*,*)
 9996 WRITE(6,1037)
      CALL EXIT
      ENTRY S9997 (TEMP,SPKT,SPKT2,*,*,*)
 9997 REWIND 4
      LINE = 66
      WRITE (6,6060)
 6060 FORMAT (///,1X,'*****  END OF JOB - - P001 SCENARIO RUN COMPLETE',
     1  '  *****')
      RETURN 3
 6061 CALL PAGES(3,0,JP)
      WRITE (6,1061)
  990 READ(4,1062,END=991) ICARD,IPRINT,I
      CALL PAGES(1,3,JP)
      IF (JP.EQ.0) WRITE (6,1061)
      WRITE (6,1063) ICARD,IPRINT,I
      IF(ISW.NE.IOFF) CALL AVG(ICARD(3),IPRINT,ISW)
      GO TO 990
  991 REWIND 4
      CALL EXIT
      RETURN 3
 9998 WRITE(6,1006)I,ICARD
      CALL EXIT
      RETURN 3
 9999 WRITE(6,1002)
      CALL EXIT
      RETURN 3
 1002 FORMAT(//'-UNEXPECTED END-OF-RECORD/FILE ENCOUNTERED.')
 1006 FORMAT(////'-IMPROPER INPUT CARD ENCOUNTERED.  "',I2,19A4,A2,'"')
 1027 FORMAT(////'-GUN TYPE',I2,',  ERROR MODE',I2,'.  COMBINATION INVAL
     1ID.')
 1037 FORMAT(////'-UNRECOVERABLE PARITY ERROR DETECTED.  CALL EXIT.')
 1039 FORMAT(' ECM SHOULD NOT BE SPECIFIED WHEN IEM IS 1 OR 2 ')
 1040 FORMAT(' MULTIPATH TRACKING ERROR SPECIFIED WITH IEM=3 ONLY ')
 1061 FORMAT(1H0,4X'DATE',7X'TIME',4X'LCC   GT   EM   CB   SB   GL',5X'P(K',
     1     'ILL)   RDS     XGUN     YGUN     ZGUN   F TIME     PAGE'/)
 1062 FORMAT(2A9,A3,5A2,A10,A5,2A7,3A6)
 1063 FORMAT(2(2X,A9),2X,A3,5(2X,A2),2X,A10,1X,A5,2(1X,A7),3(2X,A6))
      RETURN 3
   87 RETURN 1
   55 RETURN 2
 9992 GO TO IERR,(3,28,9996)
 9993 GO TO IEOF,(4,12,40,70,83,9997,9999)
      END
```

```
      SUBROUTINE PAGES(N,NT,JP)
C
C     KEEPS NUMBER OF LINES PER PAGE LESS THAN 59, PRINTS HEADER,
C         AND GETS TIME INFORMATION FROM SYSTEM.  REPLACES
C         NPAGE(MAX) AND HEADER IN AFATL PROGRAM.
C
C     N       NUMBER OF LINES TO BE PRINTED BEFORE NEXT CALL TO PAGES.
C     NT      NUMBER OF LINES IN TITLE OR HEADER OF DATA BEING PRINTED.
C             IF CALL TO PAGES IS TO PRINT HEADER ONLY, "N" SHOULD
C             BE NUMBER OF LINES AND "NT" SHOULD BE ZERO.
C     JP      FLAG FROM PAGES, SET TO ZERO WHEN A NEW PAGE IS STARTED
C             INDICATING NECESSITY TO PRINT HEADER.
      COMMON /BLOCK1/ ITITLE(20)
      COMMON /HEADFO/ LINE,NUMBER
      JP = 2
      LINE = LINE + N
      IF (LINE .LT. 59) RETURN
      NUMBER = NUMBER + 1
      WRITE (6,1000) ITITLE,NUMBER
      LINE = 2 + N + NT
      JP = 0
      RETURN
 1000 FORMAT('1AFATL P-001 AAASIM "',17A4,'"',A10,2(1XA9),2X'PAGE',I4/)
      END
      SUBROUTINE PRSEGS(P,ISL)
C
C     PRINTS THE PK AS A FUNCTION OF ASPECT AND IMPACT SPEED TABLES
C
C     THIS SUBROUTINE EXTENSIVELY MODIFIED TO PRINT ASPECT SECTOR
C         ANGLES AND PROPERLY LABEL THE TWO CASES FOR WHICH IT
C         PRINTS TABLES.
      COMMON /BLOCK3/ XGUN,YGUN,ZGUN
      COMMON /BLOCK4/ IGT,IEM,ICB,ISB,IGL,CIRCLE
      DIMENSION P(32,8),PT(8)
      REAL*8 ANG(8)/'315-360','000-045','045-090','090-135','135-180',
     1'180-225','225-270','270-315'/
 8888 CONTINUE
      PK = 0.0
      PT(1) = 0.0
      PT(2) = 0.0
      PT(3) = 0.0
      PT(4) = 0.0
      PT(5) = 0.0
      PT(6) = 0.0
      PT(7) = 0.0
      PT(8) = 0.0
  111 CALL PAGES(6,0,JP)
  222 IF (ISL.GT.0) WRITE (6,1001) ISL,IGT,IEM,XGUN,YGUN,ZGUN,CIRCLE
```

```
  333 IF (ISL.EQ.0) WRITE (6,1030)
  444 WRITE(6,1040)
  555 DO 2 I=1,32
  666 IAZ = 1 + MCD(I,8)
  777 IEL = 2 + (I-1)/8
  888 PP=0.0
  999 DO 3 J=1,8
  112 PT(J)=PT(J)+(1.0-PT(J))*P(I,J)
  113 PK = PK + (1.0-PK) * P(I,J)
    3 PP=PP+(1.0-PP)*P(I,J)
      CALL PAGES(1,6,JP)
      IF (JP.NE.0) GO TO 2
      IF (ISL.GT.0) WRITE (6,1001) ISL,IGT,IEM,XGUN,YGUN,ZGUN,CIRCLE
      IF (ISL.EQ.0) WRITE (6,1030)
      WRITE (6,1040)
    2 WRITE (6,1041) I,ANG(IAZ),ANG(IEL),(P(I,J),J=1,8),PP
      CALL PAGES(2,6,JP)
      IF (JP.NE.0) GO TO 4
      IF (ISL.GT.0) WRITE (6,1001) ISL,IGT,IEM,XGUN,YGUN,ZGUN,CIRCLE
      IF (ISL.EQ.0) WRITE (6,1030)
      WRITE (6,1040)
    4 WRITE (6,1042) PT,PK
 8889 CONTINUE
      RETURN
 1001 FORMAT('-PK AS A FUNCTION OF ASPECT SECTOR AND IMPACT SPEED.',
     1     5X'LOC',I4,5X'GT',I2,5X'EM',I2,5X'X',F7.0,3X'Y',F7.0,3X'Z',
     2     F7.0,4X'RADIUS',F5.0,'M')
 1030 FORMAT('-TOTAL PK FOR DENSITY CLASS 1 AS A FUNCTION OF ASPECT',
     1     ' SECTOR AND IMPACT SPEED.')
 1040 FORMAT('OSECTOR   AZIMUTH    ELEV.',4X'0-152       152-305      ',
     1     '305-457      457-610      610-762      762-914      914-1067',
     2     4X'1067-1219       TOTAL PK' / 9X'REAR=00   DOWN=00')
 1041 FORMAT(I4,2X,A7,2X,A7,8F12.7,F14.7)
 1042 FORMAT(1H0,15X'TOTALS',8F12.7,F14.7)
      END
      SUBROUTINE TPLOT(NFPA)
C
C     PLOTS X VS. Y AND X VS. Z ON PRINTER FOR EACH FLIGHT PATH.
C          NO PLOT WHEN XMAX-XMIN IS LESS THAN 50.
C
      COMMON   XFPA(1201), YFPA(1201), ZFPA(1201),
     1         BFPA(1201), AFPA(1201), PFPA(1201),
     2         VXFPA(1201),VYFPA(1201),VZFPA(1201)
      DIMENSION PLOT(111)
      LOGICAL XA
      DATA BLANK,YAXIS,XAXIS,POINT/1H ,1H:,1H-,1H+/
C     PLOT ONLY ABOUT 50 POINTS WITH "IFPA".
      IFPA = MAXO(NFPA/50,1)
```

```
C     FIND MIN-MAX VALUES OF X, Y, AND Z (ZMIN = 0. BY DEFN.)
      XMIN = 1.E99
      YMIN = 1.E99
      XMAX = -1.E99
      YMAX = -1.E99
      ZMAX = -1.E99
      DO 100 I=1,NFPA,IFPA
      XMIN = AMIN1(XMIN,XFPA(I))
      YMIN = AMIN1(YMIN,YFPA(I))
      XMAX = AMAX1(XMAX,XFPA(I))
      YMAX = AMAX1(YMAX,YFPA(I))
  100 ZMAX = AMAX1(ZMAX,ZFPA(I))
C     CHECK X RANGE TO AVOID FUNNY X-Z PLOT.
      XRNG = XMAX - XMIN
      IF (XRNG .GT. 49.999) GO TO 110
      CALL PAGES(3,0,I)
      WRITE (6,210)
      RETURN
C     SCALE X,Y TO METERS PER CHARACTER.
  110 D = AMAX1(XRNG/11.,(YMAX-YMIN)/7.25)
      DX = D/10.
      DY = D/8.
C     CENTER PLOT BY RE-CALCULATING X-Y MIN-MAX.
      XMIN = (XMAX+XMIN)/2. - 55.*DX
      YMIN = (YMAX+YMIN)/2. - 29.*DY
      XMAX = XMIN + 110.*DX
      YMAX = YMIN + 58.*DY
C     SCALE Z (NOT TO SAME SCALE AS X-Y).
      DO 120 I=1,100
      D = FLOAT(I*500)
      IF (D .GT. ZMAX) GO TO 130
  120 CONTINUE
  130 DZ = D/10.
C     SEE IF AXES SHOULD APPEAR ON PLOT.
      XA = .FALSE.
      NYA = -10
      IF (XMIN .LE. 0. .AND. XMAX .GE. 0.) XA = .TRUE.
      IF (YMIN .LE. 0. .AND. YMAX .GE. 0.) NYA = 59 - INT(0.5-YMIN/DY)
      IF (XA) NXA = 1 + INT(0.5-XMIN/DX)
C     SET 8 LINES PER INCH SPACING ON PRINTER.
      WRITE (6,280)
C     SET PAGE CONTROL, PLOT X-Z, THEN X-Y.
      CALL PAGES(56,0,I)
      WRITE (6,250)
      WRITE (6,220)
      IFPA = 2 * IFPA
      DO 160 K=1,11
      DO 140 I=1,111
```

```
      PLOT(I) = BLANK
  140 IF (K.EQ.11) PLOT(I)=XAXIS
      IF (XA .AND. K.NE.11) PLOT(NXA) = YAXIS
      Z = FLOAT(11-K)*DZ
      DO 150 I=1,NFPA,IFPA
      IX = 1+INT(0.5+(XFPA(I)-XMIN)/DX)
  150 IF (K .EQ. 11-INT(0.5+ZFPA(I)/DZ)) PLOT(IX) = POINT
  160 WRITE (6,230) PLOT,Z
      WRITE (6,220)
      WRITE (6,250)
      WRITE (6,220)
      IFPA = IFPA/2
      DO 190 K=1,59
      DO 170 I=1,111
      PLOT(I) = BLANK
  170 IF (K .EQ. NYA) PLOT(I) = XAXIS
      IF (XA) PLOT(NXA) = YAXIS
      Y = YMIN + FLOAT(59-K)*DY
      DO 180 I=1,NFPA,IFPA
      IX = 1 + INT(0.5+(XFPA(I)-XMIN)/DX)
  180 IF (K .EQ. 59-INT(0.5+(YFPA(I)-YMIN)/DY)) PLOT(IX) = POINT
      I = MOD(K,2)
      IF (I.NE.1) WRITE (6,240) PLOT
  190 IF (I.EQ.1) WRITE (6,260) PLOT,Y
      WRITE (6,220)
      WRITE (6,250)
C     PRINT X AXIS VALUES.
      D=10.*DX
      DO 200 I=1,12
  200 PLOT(I) = XMIN + D*FLOAT(I-1)
      WRITE (6,270) (PLOT(I),I=1,12),DX,DY
C     RE-SET PRINTER SPACING BACK TO 6 LINES PER INCH.
      WRITE (6,290)
      RETURN
  210 FORMAT('ONEARLY CONSTANT X IN FLIGHT PATH.  NO PLOT PRINTED.'/)
  220 FORMAT(1X,113(1H*))
  230 FORMAT(2H *,111A1,1H*,3X'Z =',F8.1,' M')
  240 FORMAT(2H *,111A1,1H*)
  250 FORMAT(2X'A', 9X'B', 9X'C', 9X'D', 9X'E', 9X'F',
     1       9X'G', 9X'H', 9X'I', 9X'J', 9X'K', 9X'L')
  260 FORMAT(2H *,111A1,1H*,3X'Y =',F8.1,' M')
  270 FORMAT('OX(A)=',F8.1,' M',4X'X(B)=',F8.1,' M',4X'X(C)=',F8.1,' M',
     1       4X'X(D)=',F8.1,' M',4X'X(E)=',F8.1,' M',4X'X(F)=',F8.1,' M',
     2       4X'X(G)=',F8.1,' M'/1X'X(H)=',F8.1,' M',4X'X(I)=',F8.1,' M',
     3       4X'X(J)=',F8.1,' M',4X'X(K)=',F8.1,' M',4X'X(L)=',F8.1,' M',
     4       4X' DX =',F8.1,' M',4X' DY =',F8.1,' M')
  280 FORMAT(1HT)
  290 FORMAT(1HS)
```

```
      END
      SUBROUTINE RPLANE(T)
C
C     COMPUTES INFORMATICN ABOUT THE POSITION OF THE AIRCRAFT AT TIME =T
C
      COMMON/BLOCK2/NFPA,TMIN,TMAX,DTFPA
      CCMMON/BLOCK3/XGUN,YGUN,ZGUN
      CCMMON/NFPARM/XA,YA,ZA,RA2,RA,TIME
      CCMMON/IGXGYG/IG,XG(8),YG(8)
      COMMON XFPA(1201),YFPA(1201),ZFPA(1201),BFPA(1201),AFPA(1201),
     1        PFPA(1201),VXFPA(1201),VYFPA(1201),VZFPA(1201)
      CCMMON/CECM1/IRECM,IJ,GAINJ,IX,XSEC,CALX,PJW,
     *        X,Y,Z,ROL,PIT,HDG,
     *          FTGT,FJAM,GJ,SJT,SN
      CALL INTERP((T+TIME)/DTFPA)
      XA=GETVAL(XFPA)-XGUN-XG(IG)
      YA=GETVAL(YFPA)-YGUN-YG(IG)
      ZA=GETVAL(ZFPA)-ZGUN
      RA2=XA*XA+YA*YA+ZA*ZA
      RA=SQRT(RA2)
      RETURN
      END
      FUNCTION ANGLIM(X)
C
C     LIMITS ANGLES TO PRINCIPAL ANGLES BETWEEN -PI AND +PI
C
      CCMMON /CONSTS/ DEGREE,RADIAN,PI,PI2,QTRPI,SQRT2
      IF(ABS(X)-PI)1,1,2
    1 ANGLIM=X
      RETURN
    2 ANGLIM=X-PI2*FLOAT(IFIX((X+SIGN(PI,X))/PI2))
      RETURN
      END
      FUNCTION RSHELL(T)
C
C     CCMPUTES RANGE TO SHELL AT TIME = T
C
      CCMMON/VSASBS/VMUZZ,ASHCON,BSHCON,DQUAD
      DQUAD=1.0+T*(ASHCON+T*BSHCON)
      RSHELL=T*VMUZZ/DQUAD
      RETURN
      END
      FUNCTION VSHELL(T)
C
C     COMPUTES SPEED OF SHELL AT TIME=T.  CAN ONLY BE USED AFTER A CALL
C     TO RSHELL AT THE SAME TIME, SINCE RSHELL COMPUTES DQUAD FOR VSHELL
C
      CCMMON/VSASBS/VMUZZ,ASHCON,BSHCON,DQUAD
```

```
      VSHELL=VMUZZ*(1.0-BSHCON*T*T)/(DQUAD*DQUAD)
      RETURN
      END
      SUBROUTINE INTERP(FINT)
C
C     SETS CONSTANTS (FRACT, INDEX1, AND INDEX2) FOR TWO PCINT INTER-
C      PCLATION
C
      CCMMON/MAGIC/FRACT,INDEX1,INDEX2
      INDEX1=FINT
      FRACT=FINT-FLOAT(INDEX1)
      INDEX1=INDEX1+1
      INDEX2=INDEX1+1
      RETURN
      END
      FUNCTION GETVAL(ARRAY)
C
C     PERFORMS TWG POINT INTERPOLATION
C
      CCMMON/MAGIC/FRACT,INDEX1,INDEX2
      DIMENSICN ARRAY(1201)
      GETVAL=ARRAY(INDEX1)+FRACT*(ARRAY(INDEX2)-ARRAY(INDEX1))
      RETURN
      END
      BLOCK DATA
      CCMMON /BLOCK1/  ITITLE
      COMMON /BLOCK3/  XGUN,YGUN,ZGUN
      COMMON /BLOCK4/  IGT,IEM,ICB,ISB,IGL,CIRCLE
      COMMON /BLOCK5/  NRHOS,RHO(9)
      CCMMON /BLOCK6/  NTINTS,TINTER(10)
      COMMON /BLOCK7/  IVACOM    ,VAT(9,5,9)
      COMMON /BLOCK8/  TREACT,TRACK1,TRACK2
      COMMON /BLOCK9/  TROUND(6),THDMAX(6),PHDMAX(6),PHIMIN(6),PHIMAX(6),
     1                 VELMIN(6),VELMAX(6),RANMIN(6),RANMAX(6),ATLAG(6),
     2                 ETHMAX(6),EPHMAX(6),RMODES(6)
      COMMON /BLOCKA/  TFMAX1(6),TFMAX2(6),RVACON(6),RVBCCN(6),VMUZEL(6)
      COMMON /CONSTS/  DEGREE,RADIAN,PI,PI2,QTRPI,SQRT2
      CCMMON /HEADFO/  LINE,NUMBER
      CCMMON /BUDGET/  BCACON(6)
      CCMMON /NEWA/ VY1,VY,ALFA,J,IRMP,PLEN,O1,O8,D1,JJJ,XR,ZT,PZI,IERR
      CCMMON /NEWB/ Y1,P2,VX,BETA,IF6,IMUL,IP,N,O7,C,TTRACK,KMODE,PSI,K
      CCMMON /NEWC/ CP,X2,P1,B2,JFILE,IJAM,ISL,C4,CFS,TPERS,JMODE,YT,T2
      CCMMON /NEWD/ T33,X1,Z2,B1,VX2,C3,CPK,NROUNC,IOFF,I,XT,TM,SP,T1
      COMMON /NEWE/ Z1,A2,VX1,VZ2,PHI,IF5,IEOF,YR,IF2,T13,IFILE,Y2,A1
      CCMMON /NEWF/ V2,VZ1,V,FUZZ,IF9,SC2RJ,SD2RJM,V1,VY2,F,JP,IF7,REFC
      CCMMON /NEWG/ SJTMAX,O2,PK,D2,ISW
      DATA IJAM/0/,SD2RJ/0./
      DATA IMUL/0/
```

```
      DATA IOFF/2HOF/
      DATA IF2,IF5,IF6,IF7,IF9/1,1,1,1,1/
      DATA VX2/0.0/,VY2/0.0/,VZ2/0.0/
      DATA X2/0.0/,Y2/0.0/,Z2/0.0/,V2/0.0/,P2/0.0/,A2/0.0/,B2/0.0/
      DATA IFILE/9999/,JFILE/9999/,             FUZZ/0.000000001/
C     VALUES ON "ASIDOC" CARDS FROM A.S.I. DOCUMENTATION DRAFT.     (BEE)
      DATA ATLAG  /2*9999.99,1.33,9999.99,2*1.33/
      DATA BCACON /.00265,.00501,.0031,.00697,.00113,.00113/
      DATA DEGREE /57.295779513082/,  RADIAN/0.017453292519994/
      DATA EPHMAX /6*.1/,      ETHMAX /6*.1/
      DATA IGT    /3/,  IEM/4/,  ICB/1/,  ISB/4/,  IGL/1/,  CIRCLE/0./
      INTEGER ITITLE(20)/7*'    ','ASD/','XROA',11*'    '/
      INTEGER IVACOM(20)/20*'    '/
      DATA LINE   /66/,  NUMBER/0/
      DATA NRHOS  /9/
      DATA NTINTS /10/
      DATA PHDMAX /.43633,.43633,.78540,.34910,.31416,.3491/
      DATA PHIMAX /1.48353,1.57079,1.48353,1.48353,1.51844,1.43117/
      DATA PHIMIN /-.17453,-.14835,-.17453,-.08727,-.06981,-.05236/
      DATA PI     /3.14159265358 98/,   PI2/6.2831853071796/
      DATA QTRPI  /0.785398163397 45/
      DATA RANMAX /3000.,3000.,3300.,5000.,5500.,99999./
      DATA RANMIN /0.0,400.,500.,0.,0.,99999./
      DATA RHO    /1.,.5,.3333333333,.25,.2,.1666666666,.1,.02,.01/
      DATA RMODES /-1.,-1.,400.,-1.,1500.,0.0/
      DATA RVACON /.180209,.251499,.22998,.089321,.07845,.050694/
      DATA RVBCON /.012392,-.006259,-.006889,.004262,-.000421,-.000357/
      DATA SQRT2  /1.4142135623731/
C     TFMAX CARDS PROVIDE EXACT AGREEMENT WITH AFATL PROGRAM ON TEST
C        CASE, BUT NOT EXACT VALUES FOR MAX RANGE.   13 FEB 73     (BEE)
      DATA TFMAX1 /1.6,2.2,3.8,4.1,6.2,99.99/
      DATA TFMAX2 /99.99,99.99,7.5,99.99,11.6,19.2/
      DATA THDMAX /0.5236,.5236,1.39626,0.52360,.5236,.5236/
      DATA TINTER /10.,20.,30.,40.,50.,60.,70.,80.,90.,999.99/
      DATA TREACT /0./,   TRACK1/2.5/,   TRACK2/6.0/
      DATA TROUND /.75,.4,.2,.75,.857,4./
      DATA VAT    /405*0./
      DATA VELMAX /300.,300.,350.,250.,300.,999.9/
      DATA VELMIN /0.,0.,0.,0.,0.,999.9/
      DATA VMUZEL /840.,1000.,930.,880.,960.0,800./
      DATA XGUN   /0./
      DATA YGUN   /0./
      DATA ZGUN   /0./
      END
      SUBROUTINE AVG(ITST,IPRINT,ISW)
      DIMENSION IPRINT(6)
      DATA IBLNK,SUM,CNT/2H  ,0.0,0.0/
      DATA IALL/2HAL/
```

```
      CALL REREAD
         READ (99,900)            PK
  900 FORMAT(F10.7)
         READ (99,910)            YGUN
  910 FORMAT(F7.0)
      IF(ISW.EQ.IALL) GOTO 600
      IF(ITST.EQ.IBLNK) GOTO 200
      IF(YGUN.NE.0.0) GOTO 150
      CNT=CNT+0.5
      SUM=SUM+PK/2.
      POLD=0.0
      GOTO 500
150   CONTINUE
      CNT=CNT+1.0
      SUM=SUM+PK
      POLD=PK
      GOTO 500
200   IF(CNT.LE.0.5) GOTO 500
      CNT=CNT-0.5
      SUM=SUM-POLD/2.0
201   AVERG=SUM/CNT
      WRITE(6,800) CNT,AVERG
  800 FORMAT(/5X,18HAVERAGE P(KILL) ON,F6.1,20H OFFSET LOCATIONS IS,
     X       F10.7/)
      SUM=0.0
      CNT=0.0
  500 RETURN
600   IF(ITST.NE.IBLNK) GOTO 610
      IF(CNT.NE.0.0) GOTO 201
      GOTO 500
610   SUM=SUM+PK
      CNT=CNT+1.0
      GOTO 500
      END
      SUBROUTINE JAMER1(PLEN,SDSQ)
      SDR = PLEN*0.6826/2.*2.998E8
      SDSQ = SDR*SDR
      RETURN
      END
      SUBROUTINE MULPTH(I,REFC,EL,BIAS,SD2)
      DIMENSION C(3),S(3),B(3)
      DATA
     * AK/-0.6931471806/
     *,SQRT2/1.414213562/
     *,B/0.0244346,0.0314159,0.0785398/
     *,C/0.0132557,0.0185345,0.0478558/
     *,S/0.00872665,0.0104720,0.0244346/
      BW = B(I)
```

```
      CAL = C(I)
      SQ = S(I)
      DIR = EXP(AK*(SQ/BW)**2)
      EL2 = 2.*EL
      RU = EXP(AK*((EL2+SQ)/BW)**2)
      RL = EXP(AK*((EL2-SQ)/BW)**2)
      DRU1S = (DIR+REFC*RU)**2
      DRU2S = (DIR-REFC*RU)**2
      DRL1S = (DIR+REFC*RL)**2
      DRL2S = (DIR-REFC*RL)**2
      DIF1 = (DRU1S-DRL1S)
      SUM1 = (DRU1S+DRL1S)
      DIF2 = (DRU2S-DRL2S)
      SUM2 = (DRU2S+DRL2S)
      SIGER1 = DIF1/SUM1
      SIGER2 = DIF2/SUM2
      ANGER1 = CAL*SIGER1
      ANGER2 = CAL*SIGER2
      PPBY2 = ABS(ANGER2-ANGER1)/2.
      BIAS = ANGER1+PPBY2
      SD = PPBY2/SQRT2
      SD2 = SD*SD
      RETURN
      END
      SUBROUTINE ECM1
      DIMENSION RGDB(3),PRW(3),FREQ(3),IRTYP(4),RNOISE(3)
      DIMENSION TABJ(37,37),TABX(37,37)
      COMMON /BLOCK1/ ITITLE(10)
      COMMON /HEADFO/ LINE,NUMBER
      COMMON
     */CECM1/IRECM,IJ,GAINJ,IX,XSEC,CALX,PJW,
     *       X,Y,Z,ROL,PIT,HDG,
     *        FTGT,FJAM,GJ,SJT,SN
C
      NAMELIST/NAM1/RGDB,PRW,FREQ,IRTYP,I,RG,WL,FTGT,FJAM,PJW
      DATA
     * RGDB/40., 38.5, 28./
     *,PRW/105000., 175000.,250000./
     *,FREQ/15.1E9, 9.3805E9, 2.838E9/
     *,IRTYP/1,2,2,3/
     *,PI4/12.56637061/
     *,RNOISE/-123.0,-130.6,-132.2/
C
      I = IRTYP(IRECM)
      RG = 10.**(RGDB(I)/10.)
      WL = 2.998E8/FREQ(I)
      RN = RNOISE(I)
      FTGT = PRW(I)*RG*RG*WL*WL/PI4/PI4/PI4
```

```
      FJAM = PJW*RG*WL*WL/PI4/PI4
      CALL PAGES(3,0,JP)
      IF(IJ.EQ.0) WRITE(6,9003) GAINJ
 9003 FORMAT(//,' JAMMER ANTENNA GAIN',F7.3,' DB')
      IF(IJ.NE.0) WRITE(6,9004)
 9004 FORMAT(//,' JAMMER TABLE SPECIFIED')
      CALL PAGES(3,0,JP)
      IF(IX.EQ.0) WRITE(6,9005) XSEC
 9005 FORMAT(//,' AIRCRAFT CROSS SECTION ',F9.2,' SQ.METERS')
      IF(IX.NE.0) WRITE(6,9006) CALX
 9006 FORMAT(//,' AIRCRAFT CROSS SECTION TABLE SPECIFIED. ',
     *' PRINTED VALUES WILL BE MULTIPLIED BY CALX. CALX= ',F9.2)
      IF(IJ.EQ.0) GO TO 1
C
C     JAMMER TABLE
C
      CALL TABLR(TABJ,37)
      DO 3 I=1,37
      DO 3 J=1,37
      TABJ(I,J) = 10.**(TABJ(I,J)/10.)
    3 CONTINUE
    1 GJ = 10.**(GAINJ/10.)
      IF(IX.EQ.0) GO TO 2
C
C     X-SECTION TABLE
C
      CALL TABLR(TABX,37)
    2 RETURN
C
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
C
      ENTRY ECM2
C
      NAMELIST/NAM2/ X,Y,Z,ROL,PIT,HDG,
     *CX1,CY1,CZ1,CX2,CY2,CZ2,AZ,EL,GAINJ,XSEC,D2,SJ,ST,SJT
     *,GJ
C
      IF(IX.EQ.0 .AND. IJ.EQ.0) GO TO 5
      CALL DIRCOS(X,Y,Z,0.,0.,0.,CX1,CY1,CZ1)
      CALL CARROT(CX1,CY1,CZ1,ROL,PIT,HDG,CX2,CY2,CZ2)
      CALL RECSPH(CX2,CY2,CZ2,AZ,EL)
      IF(IJ.EQ.0) GO TO 6
      CALL INTRP(TABJ,AZ,EL,37,GJ)
    6 IF(IX.EQ.0) GO TO 5
      CALL INTRP(TABX,AZ,EL,37,XSEC)
      XSEC = XSEC*CALX
    5 D2 = DIST2(X,Y,Z,0.,0.,0.)
      SJ = FJAM*GJ/D2
```

```
      ST = FTGT*XSEC/D2/D2
      SN = 10.*ALOG10(ST)-RN
      SJT = 10.*ALOG10(SJ/ST)
      RETURN
      END
      SUBROUTINE JAMER2(IRAD,AJS,SDSQ)
      DIMENSION AJS1(3),SD1(3)
      DIMENSION AJS2(4),SD2(4)
      DIMENSION AJS3(2),SD3(2)
      DIMENSION AJS4(4),SD4(4)
      DATA
     * N1/3/
     *,AJS1/ -5., 6., 9./
     *,SD1/ 0.002963, 0.01185, 0.1374 /
      DATA
     * N2/4/
     *,AJS2/ -2., 6., 10., 16./
     *,SD2/ 0.002963, 0.009877, 0.08278, 0.1374 /
      DATA
     * N3/2/
     *,AJS3/15., 30./
     *,SD3/ 0.0018, 0.01441 /
      DATA
     * N4/4/
     *,AJS4/ -2., 6., 10., 16./
     *,SD4/ 0.006914, 0.02173, 0.1024, 0.1374 /
      GO TO (1,2,3,4),IRAD
    1 CALL INT2(N1,AJS1,SD1,AJS,SD)
      GO TO 5
    2 CALL INT2(N2,AJS2,SD2,AJS,SD)
      GO TO 5
    3 CALL INT2(N3,AJS3,SD3,AJS,SD)
      GO TO 5
    4 CALL INT2(N4,AJS4,SD4,AJS,SD)
    5 SDSQ = SD*SD
      RETURN
      END
      SUBROUTINE INT2(NVAL,X,Y,XVAL,YVAL)
      DIMENSION X(NVAL),Y(NVAL)
      YVAL = Y(1)
      IF(X(1)-XVAL) 4,4,3
    4 DO 1 I=1,NVAL
      IF(X(I)-XVAL) 1,1,2
    1 CONTINUE
      YVAL = Y(NVAL)
      GO TO 3
    2 YVAL = Y(I-1) + (Y(I)-Y(I-1)) / (X(I)-X(I-1)) * (XVAL-X(I-1))
    3 RETURN
```

```
      ENC
      SUBROUTINE TABLR(TABX,IDIM)
C
C SUBROUTINE TO READ AND PRINT A TABLE CF UP TO 37 X 37 ELEMENTS
C THE PROGRAM PROVIDES A DEFAULT VALUE FOR ELEMENTS OUTSIDE THE
C DEFINED TABLE.
C             INPUTS ARE:
C CARD  VARIABLE   FORMAT   DEFINITION
C  1       INAME    8A10    ARBITRARY IDENTIFICATION
C  2        NAZ       I5    NO. OF AZ ELEMENTS
C                           (ASSUMING ELEMENT 1 CORRESPONDS TO AZ=0)
C           NEL       I5    NO. OF EL ELEMENTS,EL GCES-ELEND TO +ELEND
C          ELEND    F10.4   MAXIMUM ENTRY EL(DEG)
C          AZEND    F10.4   MAXIMUM ENTRY AZ(DEG)
C          DEFALT   F10.4   DEFAULT VALUE
C 3+    TABX(IDIM,1) 8F10.0 DATA TABLE
C
      CCMMON/TABLES/ELO,DELAZ,DELEL,JEL
      DIMENSION TABX(IDIM,IDIM),INAME(8)
      DATA LE,LZ/2HEL,2HAZ/
      DATA AZO,CDTR/0.,.0174533/
      READ(5,98) INAME
      READ(5,99) NAZ,NEL,ELEND,AZEND,DEFALT
   98 FCRMAT(8A10)
   99 FORMAT(2I5,3F10.4)
C NOTE IMPLIED INCREMENT
      DELAZ=AZEND/(NAZ-1)
      DELEL=(2.*ELEND)/(NEL-1)
C LOCATE FIRST ELEVATION ENTRY ETC
      JEL=(IDIM-NEL)/2 +1
      MEL=JEL+NEL-1
      ELO=-ELEND
      WRITE(6,101)INAME,NAZ,AZO,AZEND,CELAZ,
     1LZ,NEL,ELO,ELEND,DELEL,LE,DEFALT
  101 FCRMAT('1  TABLE DATA',/,1X,8A10,/,2(1X,I5,
     1' ELEMENTS FROM ',F10.2,' TO ',F10.2,' BY ',
     2F10.2,2X,A2,/),' ELSEWHERE TABLE IS ',F10.2)
C INSERT DEFAULT
      MAZ=(180./DELAZ)+1
      IF ((MAZ.GT.37).OR.(MEL.GT.37)) GO TO 999
      DC 8 IAZ=1,MAZ
      DO 8 IEL=1,IDIM
    8 TABX(IEL,IAZ)=DEFALT
C READ TABLE
      DC 14 I=JEL,MEL
      READ(5,102) (TABX(I,J),J=1,NAZ)
   14 CONTINUE
  102 FORMAT(8F10.0)
```

```
      IDELAZ=DELAZ
      NPAGE=NAZ/13+1
      DO 20 LP=1,NPAGE
      JH1=(LP-1)*13*IDELAZ
      JH2=JH1+12*IDELAZ
      KH1=(LP-1)*13+1
      KH2=KH1+12
      IF(LP.EQ.NPAGE)KH2=MAZ
      IF(LP.EQ.NPAGE)JH2=180
      WRITE(6,106)(JH,JH=JH1,JH2,IDELAZ)
  106 FORMAT('1  RCS MATRIX',/,'    ELEV ',13I9)
      JELO=MAX0(JEL-1,1)
      MELO=MIN0(MEL+1,IDIM)
      ELPT=ELO-DELEL*(JEL-JELO)
C PRINT TABLE
      DO 15 J=JELO,MELO
      WRITE(6,104)ELPT,(TABX(J,K),K=KH1,KH2)
  104 FORMAT(1X,F7.1,2X,13F9.2)
      ELPT=ELPT+DELEL
   15 CONTINUE
   20 CONTINUE
C CONVERT TO RADIANS
      DELEL=DELEL*CDTR
      DELAZ=DELAZ*CDTR
      ELO=ELO*CDTR
      RETURN
  999 CONTINUE
      WRITE(6,105)
  105 FORMAT(' >>>> ERROR IN INPUT <<<<')
      STOP
      END
      SUBROUTINE DIRCOS(X1,Y1,Z1,X2,Y2,Z2,COSA,COSB,COSG)
      XD = X2-X1
      YD = Y2-Y1
      ZD = Z2-Z1
      D = SQRT(XD*XD+YD*YD+ZD*ZD)
      COSA = XD/D
      COSB = YD/D
      COSG = ZD/D
      RETURN
      END
      SUBROUTINE CARROT(X1,Y1,Z1,ROL,PIT,HDG,X2,Y2,Z2)
C CARROT CARTESIAN ROTATION
C HEADING
      X =  X1*COS(HDG)    +    Y1*SIN(HDG)
      Y = -X1*SIN(HDG)    +    Y1*COS(HDG)
      Z =                                        Z1
C PITCH
```

```
      XX =  X*COS(PIT)                                          -Z*SIN(PIT)
      YY =                         Y
      ZZ =   X*SIN(PIT)    +                                    Z*COS(PIT)
C ROLL
      X2 =  XX
      Y2 =                        YY*COS(ROL)      +      ZZ*SIN(ROL)
      Z2 =  -YY*SIN(ROL)    +      ZZ*COS(ROL)
      RETURN
      END
      SUBROUTINE RECSPH(X,Y,Z,PHI,THE)
      THE = ARCOS(Z/SQRT(X*X+Y*Y+Z*Z))
      THE=THE-1.5708
      PHI=0.0
      SB=SQRT(X*X+Y*Y)
      IF(SB .NE. 0.0)PHI=X/SB
      PHI=ARCOS(PHI)
      PHI=ABS(PHI)
      RETURN
      END
      SUBROUTINE INTRP(TAB,AZ,EL,NVAL,VALUE)
      COMMON/TABLES/ELO,DELAZ,DELEL,JEL
      DIMENSION TAB (NVAL,NVAL)
      A=ABS(AZ)
      E=EL
      AAZ=A/DELAZ+1.
      IAZ=AAZ
      EEL=(E-ELO)/DELEL+JEL
      IEL=EEL
      IAZ=MINO(MAXO(IAZ,1),36)
      IEL=MINO(MAXO(IEL,1),36)
      V1=TAB(IEL,IAZ)
      V2=TAB(IEL,IAZ+1)
      V3=TAB(IEL+1,IAZ)
      V4=TAB(IEL+1,IAZ+1)
      S=AAZ-IAZ
      V12=V1+(V2-V1)*S
      V34=V3+(V4-V3)*S
      S=EEL-IEL
      VALUE=V12+(V34-V12)*S
      RETURN
      END
      FUNCTION DIST2(X1,Y1,Z1,X2,Y2,Z2)
      XD = X2-X1
      YD = Y2-Y1
      ZD = Z2-Z1
      DIST2 = XD*XD+YD*YD+ZD*ZD
      RETURN
      END
```

APPENDIX J

P001 PROGRAM LISTING (CDC)

```
      PROGRAM  P7022(INPUT,OUTPUT,TAPE5=INPUT,TAPE6=OUTPUT,TAPE7,TAPE8,
     1   TAPE9,TAPE4,TAPE11)
C
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
C                                                                      C
C     AAASIM -- MULTIPLE GUN ANTIAIRCRAFT ARTILLERY SIMULATION         C
C     WRITTEN BY THOMAS D. MCMURCHIE AND JAMES D. SEVERSON             C
C     AIRFORCE ARMAMENT LABORATORY (AFATL-DLYS) EGLIN AFB, FLORIDA     C
C                                                                      C
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
C                                                                      C
C                    PROGRAM RECEIVED 25 OCT 72                        C
C                CONVERTED AND MAINTAINED BY ASD/XROA                  C
C                                                                      C
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
C
      COMMON/BLOCK1/ITITLE(10)
      COMMON/BLOCK2/NFPA,TMIN,TMAX,DTFPA
      COMMON/BLOCK3/XGUN,YGUN,ZGUN
      COMMON/BLOCK4/IGT,IEM,ICB,ISB,IGL,CIRCLE
      COMMON/BLOCK5/NRHCS,RHO(9)
      COMMON/BLOCK6/NTINTS,TINTER(10)
      COMMON/BLOCK7/IVACOM(8),VAT(9,5,9)
      COMMON/BLOCK8/TREACT,TRACK1,TRACK2
      COMMON/BLOCK9/TROUND(6),THDMAX(6),PHDMAX(6),PHIMIN(6),PHIMAX(6),
     1    VELMIN(6),VELMAX(6),RANMIN(6),RANMAX(6),
     2     ATLAG(6),ETHMAX(6),EPHMAX(6),RMODES(6)
      COMMON/BLOCKA/TFMAX1(6),TFMAX2(6),RVACON(6),RVBCON(6),VMUZEL(6)
      COMMON/CONSTS/DEGREE,RADIAN,PI,PI2,QTRPI,SQRT2
      COMMON/HEADFO/LINE,NUMBER
      COMMON/NFPARM/XA,YA,ZA,RA2,RA,TIME
      COMMON/IGXGYG/IG,XG(8),YG(8)
      COMMON/MAGIC /FRACT,INDEX1,INDEX2
      COMMON/VSASBS/VMUZZ,ASHCON,BSHCON,DQUAD
      COMMON/BUDGET/BDACCN(6)
      COMMON XFPA(1201),YFPA(1201),ZFPA(1201),BFPA(1201),AFPA(1201),
     1       PFPA(1201),VXFPA(1201),VYFPA(1201),VZFPA(1201)
      COMMON/CECM1/IRECM,IJ,GAINJ,IX,XSEC,CALX,PJN,
     *       X,Y,Z,ROL,PIT,HDG,
     *        FTGT,FJAM,GJ,SJT,SN
C
      DIMENSION ICARD(8),TEMP(16,6),PTOTTF(10),PTOTTI(10)
      DIMENSION PKTTDC(9),PKTIDC(10,9),PKTFDC(10,9)
      DIMENSION SPKT(8,4,8),SPKT2(32,8),SPKTOT(32,8),IPRINT(6),IFLAGS(4)
      EQUIVALENCE (SPKT2(1,1),SPKT(1,1,1),TEMP(1,1))
C
C     SOME EQUIVALENCES REMOVED BY B.E.E. BY CARRYING TWO VARIABLES
C         THROUGH PROGRAM WITH SAME VALUES FOR CLARITY.
```

```
C
      DATA IFILE/9999/,JFILE/9999/,INUNIT/5/,FUZZ/0.000000001/
      DATA ESVPCT/0.10/
      DATA X2/0.0/,Y2/0.0/,Z2/0.0/,V2/0.0/,P2/0.0/,A2/0.0/,B2/0.0/
      DATA VX2/0.0/,VY2/0.0/,VZ2/0.0/
      DATA IF2,IF5,IF6,IF7,IF9,IFLAGS/1,1,1,1,1,0,0,0,0/
      DATA IOFF/2HOF/
      DATA IMUL/0/
      DATA IJAM/0/,SD2RJ/0./,SD2J/0./
      DATA ILOOP/-1/
      CALL FTNBIN(1,0,CPU)
      CALL SECOND(CPU)
      CALL TIMREM(CIO)
      CALL DATE(ITITLE(9))
      ASSIGN 9996 TO IERR
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
C                                                                 C
C IIIII  N   N  IIIII  TTTTT  IIIII    A    L       IIIII  ZZZZZ  EEEEE C
C   I    NN  N    I      T      I     A A   L         I       Z   E     C
C   I    N N N    I      T      I    A   A  L         I   ZZZZZ   EEE   C
C   I    N  NN    I      T      I    AAAAA  L         I     Z     E     C
C IIIII  N   N  IIIII    T    IIIII  A   A  LLLLL   IIIII  ZZZZZ  EEEEE C
C                                                                 C
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
      READ(INUNIT,1050) ISW,AMASK
      AMASK1=AMASK*57.3
      PRINT 38,AMASK1
   38 FORMAT(5X,25HMASK ANGLE FOR THIS RUN =,F6.3,5H DEG.)
 1050 FORMAT(A2,8X,F10.5)
   95 ISL=1
      IPUL = 0
      IJAM = 0
      SD2RJ = 0.
      SD2J = 0.
      DO 96 J=1,9
      PKTTDC(J)=0.0
      DO 96 I=1,10
      PKTIDC(I,J)=0.0
   96 PKTFDC(I,J)=0.0
      DO 94 I=1,32
      DO 94 J=1,8
   94 SPKTOT(I,J)=0.0
      REWIND 7
      ASSIGN 9997 TO IEOF
      GO TO 15
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
C                                                                 C
C              IIIII  N   N  PPPP   U   U  TTTTT                  C
```

```
C                 I    NN  N  P   P  U   U    T                  C
C                 I    N N N  PPPP   U   U    T                  C
C                 I    N  NN  P      U   U    T                  C
C               IIIII  N   N  P       UUU     T                  C
C                                                                C
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
   12 ASSIGN 9999 TO IEOF
   15 READ(INUNIT,1007)I,ICARD
      IF (EOF(INUNIT).NE.0.) GO TO IEOF,(4,12,40,70,83,9997,9999)
      IF (IOCHEC(INUNIT).NE.0.) GO TO IERR,(3,28,9996)
      IF(I.LE.0 .OR. I.GT.14) GO TO 9998
      GO TO (101,102,103,104,105,106,107,108,109,110,111,112
     1,113,114),I
C
C  DECODE DATA BLOCK 01 -- HEADER INFORMATION
C      XROA VERSION ALLOWS ONLY 70 SPACES FOR TITLE.
C
  101 DO 17 I=1,7
   17 ITITLE(I)=ICARD(I)
      GO TO 15
C
C  DECODE DATA BLOCK 02 -- FLIGHT PATH INPUT, TRANSLATION, ROTATION,
C                          AND INTERPOLATION
C      SUGGEST SECTION ON TAPE9 BE RE-WRITTEN FOR COMPATIBILITY WITH
C          ASD FLIGHT PATH PROGRAMS.  SEE P-1127, FOR EXAMPLE.
C
  102 DECODE(78,1028,ICARD)JMODE,KMODE,TMIN,TMAX,DTFPA,XR,YR,XT,YT,PSI,
     1 ZT
C     THIS CARD WAS ADDED
      IF2=1
      TMAX=TMAX-TMIN
      TM=0.0
      T2=-1.0
      NFPA=0
      K=0
      PZI=PSI*RADIAN
      T13=SP=SIN(PZI)
      T33=CP=COS(PZI)
      LINE=66
      IF(JMODE)5,5,1
    1 ASSIGN 4 TO IEOF
      ASSIGN 3 TO IERR
      IF(JMODE.GT.IFILE)GO TO 2
      REWIND 9
      IFILE=1
      GO TO 4
    2 IFILE=IFILE+1
    3 READ(9)
```

```
      IF (EOF(9).NE.0.) GO TO IEOF,(4,12,40,70,83,9997,9999)
      IF (IOCHEC(9).NE.0.) GO TO IERR,(3,28,9996)
      GO TO 3
    4 IF(JMODE.GT.IFILE)GO TO 2
      ASSIGN 9999 TO IEOF
      ASSIGN 28 TO IERR
      READ (9)
      IF (EOF(9).NE.0.) GO TO IEOF,(4,12,40,70,83,9997,9999)
      IF (IOCHEC(9).NE.0.) GO TO IERR,(3,28,9996)
   28 ASSIGN 9996 TO IERR
      JMODE=6
    5 T1=T2
      X1=X2
      Y1=Y2
      Z1=Z2
      P1=P2
      A1=A2
      B1=B2
      V1=V2
      VX1=VX2
      VY1=VY2
      VZ1=VZ2
      IF(JMODE)6,6,7
    6 READ(INUNIT,1000)T2,X,Y,Z,VX,VY,VZ2,B2,A2,P2
      IF (EOF(INUNIT).NE.0.) GO TO IEOF,(4,12,40,70,83,9997,9999)
      IF (IOCHEC(INUNIT).NE.0.) GO TO IERR,(3,28,9996)
      B2=B2*RADIAN
      A2=A2*RADIAN
      P2=P2*RADIAN
      V2=SQRT(VX*VX+VY*VY+VZ2*VZ2)
      GO TO 9
    7 JMODE=JMODE+1
      IF(JMODE.LE.6)GO TO 8
      JMODE=1
      READ(9)TEMP
      IF (EOF(9).NE.0.) GO TO IEOF,(4,12,40,70,83,9997,9999)
      IF (IOCHEC(9).NE.0.) GO TO IERR,(3,28,9996)
    8 T2 =TEMP( 1,JMODE)
      X  =TEMP( 2,JMODE)
      Y  =TEMP( 3,JMODE)
      Z  =TEMP( 4,JMODE)
      VX =TEMP( 5,JMODE)
      VY =TEMP( 6,JMODE)
      VZ2=TEMP( 7,JMODE)
      V2 =TEMP(11,JMODE)
      B2 =TEMP(13,JMODE)
      A2 =TEMP(14,JMODE)
      P2 =TEMP(15,JMODE)
```

```
    9 X2=XT+(X-XR)*CP+(Y-YR)*SP
      Y2=YT+(Y-YR)*CP-(X-XR)*SP
      Z2=ZT+Z
      VX2=VX*CP+VY*SP
      VY2=VY*CP-VX*SP
      B2=ANGLIM(B2-PZI)
      T2=T2-TMIN
   10 IF(TM.GT.T2)GO TO 5
      F=(TM-T1)/(T2-T1)
      NFPA=NFPA+1
      XFPA(NFPA)=X1+F*(X2-X1)
      YFPA(NFPA)=Y1+F*(Y2-Y1)
      ZFPA(NFPA)=Z1+F*(Z2-Z1)
      VXFPA(NFPA)=VX1+F*(VX2-VX1)
      VYFPA(NFPA)=VY1+F*(VY2-VY1)
      VZFPA(NFPA)=VZ1+F*(VZ2-VZ1)
      V=V1+F*(V2-V1)
      BFPA(NFPA)=ANGLIM(B1+F*ANGLIM(B2-B1))
      AFPA(NFPA)=A1+F*(A2-A1)
      PFPA(NFPA)=ANGLIM(P1+F*ANGLIM(P2-P1))
      K=K-1
      IF(K)34,34,35
   34 K=KMODE
      PHI=DEGREE*PFPA(NFPA)
      BETA=DEGREE*BFPA(NFPA)
      ALFA=DEGREE*AFPA(NFPA)
      CALL PAGES(1,2,JP)
      IF (JP.EQ.0) WRITE (6,1003)
      WRITE(6,1004)TM,XFPA(NFPA),YFPA(NFPA),ZFPA(NFPA),
     1               V,VXFPA(NFPA),VYFPA(NFPA),VZFPA(NFPA),BETA,ALFA,PHI
   35 TM=DTFPA*FLOAT(NFPA)
      IF(TM.LE.TMAX)GO TO 10
      TMAX=TM-DTFPA-FUZZ
      CALL PAGES(4,0,JP)
      WRITE(6,1005)XR,YR,XT,YT,PSI,ZT
      CALL TPLOT(NFPA)
      IF(JMODE.GT.0 .OR. INUNIT.EQ.8)GO TO 12
      ASSIGN 12 TO IEOF
   13 READ(INUNIT,1000)
      IF (EOF(INUNIT).NE.0.) GO TO IEOF,(4,12,40,70,83,9997,9999)
      IF (IOCHEC(INUNIT).NE.0.) GO TO IERR,(3,28,9996)
      GO TO 13
C
C     DECODE DATA BLOCK 03 -- WEAPON LOCATION
C
  103 DECODE(30,1008,ICARD)XGUN,YGUN,ZGUN
      GO TO 12
C
```

```
C   DECODE DATA BLOCK 04 -- WEAPON TYPE, MODE, NUMBER OF BARRELS (CYCLIC
C                            AND SIMULTANEOUS), NUMBER OF WEAPONS PER
C                            LOCATION, RADIUS OF CIRCLE OF WEAPON COMPLEX
C
  104 DECODE(14,1009,ICARD)IGT,IEM,ICB,ISB,IGL,CIRCLE
      IF(IGL-1)9998,61,66
   61 XG(1)=0.0
      YG(1)=0.0
      GO TO 12
   66 DO 16 I=1,IGL
      F=PI2*FLOAT(I)/FLOAT(IGL)
      XG(I)=CIRCLE*COS(F)
   16 YG(I)=CIRCLE*SIN(F)
      GO TO 12
C
C   DECODE DATA BLOCK 05 -- WEAPON DENSITY FACTORS
C
  105 DECODE(78,1015,ICARD)IF5,NRHOS,(RHO(I),I=1,NRHOS)
      GO TO 12
C
C   DECODE DATA BLOCK 06 -- PK ACCRUAL TIME INTERVALS
C
  106 DECODE(78,1015,ICARD)IF6,NTINTS,(TINTER(I),I=1,NTINTS)
      NTINTS=NTINTS+1
      TINTER(NTINTS)=999.99
      GO TO 12
C
C   DECODE DATA BLOCK 07 -- AIRCRAFT VULNERABLE AREAS
C
  107 DO 11 I=1,8
   11 IVACOM(I)=ICARD(I)
      READ(INUNIT,1000)(VAT(1,1,K),K=2,9)
      IF (EOF(INUNIT).NE.0.) GO TO IEOF,(4,12,40,70,83,9997,9999)
      IF (IOCHEC(INUNIT).NE.0.) GO TO IERR,(3,28,9996)
      DO 88 J=2,4
      DO 89 I=1,8
      READ (INUNIT,1000) (VAT(I,J,K),K=2,9)
      IF (EOF(INUNIT).NE.0.) GO TO IEOF,(4,12,40,70,83,9997,9999)
      IF (IOCHEC(INUNIT).NE.0.) GO TO IERR,(3,28,9996)
   89 CONTINUE
      DO 88 K=2,9
   88 VAT(9,J,K)=VAT(1,J,K)
      READ(INUNIT,1000)(VAT(1,5,K),K=2,9)
      IF (EOF(INUNIT).NE.0.) GO TO IEOF,(4,12,40,70,83,9997,9999)
      IF (IOCHEC(INUNIT).NE.0.) GO TO IERR,(3,28,9996)
      DO 18 K=2,9
      DO 18 I=2,9
      VAT(I,5,K)=VAT(1,5,K)
```

```
   18 VAT(I,1,K)=VAT(1,1,K)
      IF7=1
      GC TO 12
C
C  CECOCE DATA BLOCK 08 -- WEAPON REACTION AND TRACK TIMES
C
  108 DECODE(30,1C08,ICARD)TREACT,TRACK1,TRACK2
      GO TO 12
C
C  CECODE DATA BLOCK 09 -- WEAPON PARAMETERS
C
  109 DECODE(78,1008,ICARD)TROUND(IGT),THDMAX(IGT),PHDMAX(IGT),
     1           PHIMIN(IGT),PHIMAX(IGT),VELMIN(IGT),VELMAX(IGT),
     2           RANMIN(IGT),RANMAX(IGT)
      READ(INUNIT,1000)ATLAG(IGT),ETHMAX(IGT),EPHMAX(IGT),RMODES(IGT)
      IF (EOF(INUNIT).NE.0.) GO TO IEOF,(4,12,40,70,83,9997,9999)
      IF (IOCHEC(INUNIT).NE.0.) GO TO IERR,(3,28,9996)
      IF9=1
      GO TO 12
C
C  CECODE DATA BLOCK 10 -- SHELL PARAMETERS
C
  110 CECODE(46,1008,ICARD)TFMAX1(IGT),TFMAX2(IGT),RVACON(IGT),
     1           RVBCON(IGT),VMUZEL(IGT)
      IF9=1
      GO TO 12
C
C  CECOCE DATA BLOCK 11 -- INPUT OPTION (CARD/TAPE)
C
  111 CECODE(4,1028,ICARD)I
      IF(I)81,81,82
   81 INUNIT=5
      GO TO 15
   82 INUNIT=8
      ASSIGN 83 TC IEOF
      IF(I.GT.JFILE)GO TO 84
      REWIND 8
      JFILE=1
   83 IF(I-JFILE)12,12,84
   84 JFILE=JFILE+1
   85 READ(8,1000)
      IF (EOF(8).NE.0.) GO TO 83
      IF (IOCHEC(8).NE.0.) GO TO IERR,(3,28,9996)
      GO TO 85
C
C     DECODE DATA BLOCK 13  --- LOW ALTITUDE RADAR MULTIPATH EFFECT
C
  113 CECODE(18,1038,ICARD) IMUL,IRMP,REFC
```

```
      IF(IMUL.EQ.0) GO TO 12
      CALL PAGES(12,0,JP)
      WRITE(6,1098) IRMP,REFC
 1098 FORMAT(///,* MULTIPATH INPUTS (INITIAL OR CHANGED *,//,
     0* IRMP =        *,I5,/,
     1* REFC =        *,F6.3,///)
      GO TO 12
C
C     DECODE DATA BLOCK 14 --- ECM
C
  114 SD2RJ = 0.
      SC2RJ = 0.
      DECODE(78,1041,ICARD) IJAM,IP,IJ,GAINJ,PJW,PLEN,IX,XSEC,CALX,
     *                      IRECM,SJTMAX
      IF(IJAM.EQ.0) GO TO 12
      CALL PAGES(28,0,JP)
      WRITE(6,1096) IP,IJ,GAINJ,PJW,PLEN,IX,XSEC,CALX,IRECM,SJTMAX
 1096 FORMAT(///,* ECM INPUTS (INITIAL CR CHANGED) *,//,
     0* IP =          *,I5,/,
     1* IJ =          *,I5,/,
     2* GAINJ(DB) =*,F7.2,/,
     3* PJW(W) =    *,F9.2,/,
     4* PLEN(S) =   *,E12.6,/,
     5* IX =          *,I5,/,
     6* XSEC(SQM) =*,F10.3,/,
     7* CALX =      *,F10.3,/,
     8* IRECM =     *,I5,/,
     9* SJTMAX(DB) =*,F7.2,///)
      CALL ECM1
      IF(IRECM.EQ.3) CALL JAMER1(PLEN,SC2RJM)
      IF(IEM.EQ.4) CALL JAMER1(PLEN,SD2RJM)
      GO TO 12
C
C  DECODE DATA BLOCK 12 -- PRINT OPTIONS FOR OUTPUT FORMAT - ALSO
C                          SIGNALS FOR RUN TO BEGIN
C
  112 DECODE(6,1016,ICARD)IPRINT
C
C  PRINT DATA BLOCKS 6, 7, 9, AND 10 (IF THEY CHANGE)
C     "IF2" IS USED TO SET LINE COUNT TO PROPER VALUE.  INPUT AND
C          OUTPUT PRINT CUT START A NEW PAGE FOR EACH "12" CARD.
C
      IF (IF2.EQ.0) LINE = 66
      IF2=0
      IF(IJAM.EQ.0) GO TO 48
      IF(IP.EQ.0) GO TO 48
      WRITE(11,1043) ITITLE
      WRITE(11,1042)
```

```
      WRITE(11,1001) ISL,IGT,IEM,XGUN,YGUN,ZGUN,CIRCLE
      WRITE(11,1045)
   48 CONTINUE
      IF(IF5.EQ.0)GO TO 97
      CALL PAGES(5,0,JP)
      WRITE(6,1029)NRHOS,(RHO(I),I=1,NRHOS)
      IF5=0
   97 IF(IF6.EQ.0)GO TO 98
      CALL PAGES(5,0,JP)
      WRITE(6,1011)NTINTS,(TINTER(I),I=1,NTINTS)
      IF6=0
   98 IF(IF7.EQ.0)GO TO 99
      CALL PAGES(7,0,JP)
      WRITE(6,1010)IVACCM
      DO 19 N=1,26
      J=(N+14)/8
      I=15+N-J*8
      CALL PAGES(1,7,JP)
      IF (JP.EQ.0) WRITE (6,1010) IVACCM
   19 WRITE(6,1026)N,(VAT(I,J,K),K=2,9)
      IF7=0
   99 IF(IF9.EQ.0)GO TO 87
      CALL PAGES(10,0,JP)
      WRITE(6,1025)
      DO 86 I=1,6
      O1=PHIMIN(I)*DEGREE
      O2=PHIMAX(I)*DEGREE
      O3=THDMAX(I)*DEGREE
      O4=PHDMAX(I)*DEGREE
      O7=ETHMAX(I)*DEGREE
      O8=EPHMAX(I)*DEGREE
   86 WRITE(6,1012)I,TROUND(I),O1,O2,O3,O4,TFMAX1(I),TFMAX2(I),VMUZEL(I)
     1,RVACON(I),RVBCON(I),VELMIN(I),VELMAX(I),RANMIN(I),RANMAX(I)
     2,ATLAG(I),O7,O8
      IF9=0
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
C                                                                      C
C                SSSS  EEEEE TTTTT  U   U  PPPP                        C
C               S      E       T    U   U  P   P                       C
C                SSS   EEEE    T    U   U  PPPP                        C
C                   S  E       T    U   U  P                           C
C               SSSS   EEEEE   T     UUU   P                           C
C                                                                      C
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
   87 NROUND=0
      IF(IMUL.EQ.1 .AND. IEM.NE.3) GO TO 9994
      IF(IJAM.EQ.1 .AND. (IEM.EQ.1 .OR. IEM.EQ.2)) GO TO 9995
      CPS=1.0
```

```
      DO 14 I=1,NTINTS
      PTOTTF(I)=0.0
   14 PTOTTI(I)=0.0
      DO 27 I=1,32
      DC 27 J=1,8
   27 SPKT2(I,J)=C.0
      TPERS=TROUND(IGT)/FLOAT(IGL*ICB)
      IF(IEM.GT.1)GO TO 90
      TFMAX=TFMAX1(IGT)
      TTRACK=TRACK1
      GC TO 91
   90 TFMAX=TFMAX2(IGT)
      TTRACK=TRACK2
      VXES=VYES=VZES=0.0
   91 TIME=TMIN
      TFIRE= TMIN+TTRACK
      IF(TFIRE.GT.TMAX)GO TO 69
      TTFMAX=1.2*TFMAX
      ATLCON=0.125/ATLAG(IGT)
      EMDTA=EXP(-0.512*ATLCON)
      ETMAX=ETHMAX(IGT)
      EPMAX=EPHMAX(IGT)
      VMUZZ=VMUZEL(IGT)
      TDMAX=THDMAX(IGT)
      PCMAX=PHDMAX(IGT)
      PHMIN=PHIMIN(IGT)
      PHMAX=PHIMAX(IGT)
      ASHCON=RVACCN(IGT)
      BSHCON=RVBCON(IGT)
      RSMODE=RMODES(IGT)
      RMIN =RANMIN(IGT)
      RMAX =RANMAX(IGT)
      VMIN=VELMIN(IGT)
      VMAX=VELMAX(IGT)
      IG=1
      LINE=66
      IF (IPRINT(6).LE.0) GO TO 60
      CALL PAGES(5,0,JP)
      WRITE (6,1013) ISL,IGT,IEM,XGUN,YGUN,ZGUN,CIRCLE
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
C                                                                    C
C               TTTTT   RRRR      A       CCC     K   K              C
C                 T     R   R    A A     C   C    KK K               C
C                 T     RRRR    A   A    C        K K                C
C                 T     R  R    AAAAA    C   C    K  K               C
C                 T     R   R   A   A     CCC     K   K              C
C                                                                    C
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
```

```
C
C     COMPUTE ACTUAL AIRCRAFT PARAMETERS AT FIRE TIME FOR USE IN ERROR EQS
C
   60 CALL INTERP(TIME/DTFPA)
      X=GETVAL(XFPA)-XGUN
      Y=GETVAL(YFPA)-YGUN
      Z=GETVAL(ZFPA)-ZGUN
      VX=GETVAL(VXFPA)
      VY=GETVAL(VYFPA)
      VZ=GETVAL(VZFPA)
      ILOOP = ILOOP+1
      ROL = GETVAL(PFPA)
      PIT = GETVAL(AFPA)
      HDG = GETVAL(BFPA)
      G2=X*X+Y*Y
      G=SQRT(G2)
      THET=ATAN2(Y,X)
      PHIT=ATAN2(Z,G)
C
C      IF MULTIPATH HAS BEEN SPECIFIED(IMUL=1) AND THE ELEVATION
C      ANGLE IS MEASURED BY RADAR(IOEM=3), COMPUTE THE ELEVATION
C      TRACKING BIAS(PBMP),VARIANCE(SP2MP),AND APPARENT TARGET
C      ALTITUDE(Z).
C
      SP2MP = 0.
      PBMP = 0.
      IF(IMUL.NE.1 .OR. IOEM.NE.3) GO TO 30
      CALL MULPTH(IRMP,REFC,PHIT,PBMP,SP2MP)
      PHIT = PHIT+PBMP
      Z = G*TAN(PHIT)
   30 CONTINUE
      R = SQRT(G2+Z*Z)
      RD=(X*VX+Y*VY+Z*VZ)/R
      TD=(X*VY-Y*VX)/G2
      PD=(VZ-Z*RD/R)/G
      IF(TIME.GT.TMIN) GO TO 58
      RDD=TDD=PDD=0.0
      RANS=R
      THES=THET
      PHIS=PHIT
      ERAN2=ERAN3=ERAN4=ETHE2=ETHE3=ETHE4=EPHI2=EPHI3=EPHI4=0.0
      GO TO 59
   58 RDD=(RD-RDS)/.064
      TDD=(TD-TDS)/.064
      PDD=(PD-PDS)/.064
C
C      (STORE PREVIOUSLY OBSERVED MEAN TRACKING ERRORS FOR USE IN MEAN
C       TRACKING ERROR EQUATIONS)
```

```
C
   59 ERAN1=ERAN2
      ERAN2=ERAN3
      ERAN3=ERAN4
      ERAN4=R-RANS
      ERAN=ERAN1+.71875*(ERAN2-ERAN1)
      ETHE1=ETHE2
      ETHE2=ETHE3
      ETHE3=ETHE4
      ETHE4=(G/R)*ANGLIM(THET-THES)
      ETHE=ETHE1+.71875*(ETHE2-ETHE1)
      EPHI1=EPHI2
      EPHI2=EPHI3
      EPHI3=EPHI4
      EPHI4=PHIT-PHIS
      EPHI=EPHI1+.71875*(EPHI2-EPHI1)
C        CHECK  MASK  ANGLE
      IF(PHIT.LE.AMASK)   TFIRE= TIME+ TREACT+TTRACK
C
C     (SKIP FIRE ATTEMPT IF INSUFFICIENT TRACKING TO FIRE)
C
      IF(TIME.LE.TFIRE)GO TO 62
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
C                                                                 C
C                FFFFF  IIIII  RRRR   EEEEE                       C
C                F        I    R   R  E                           C
C                FFFF     I    RRRR   EEEE                        C
C                F        I    R  R   E                           C
C                F      IIIII  R   R  EEEEE                       C
C                                                                 C
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
      VG=SQRT(VX*VX+VY*VY)
      V =SQRT(VG*VG+VZ*VZ)
      PSI=ANGLIM(PFPA(INDEX1)+FRACT*ANGLIM(PFPA(INDEX2)-PFPA(INDEX1)))
C
C     (SKIP FIRE ATTEMPT IF MAX ALLOWED TRACKING ERROR IS EXCEEDED)
C
   54 IF(ABS(ETHE4).GT.ETMAX)GO TO 64
      IF(ABS(EPHI4).GT.EPMAX)GO TO 64
      IF(IOEM.GT.1)GO TO 56
C
C     (LIMIT INPUT RANGE ESTIMATE)
C
      RC=AMAX1(RMIN,AMIN1(RMAX,RANS-0.575*RD))
C
C     COMPUTE MEAN ASSUMED TIME OF FIRE AIRCRAFT POSITION (MECHANICAL
C      COMPUTATION)
C
```

```
      XF=RC*CTBCPB-XG(IG)
      YF=RC*STBCPB-YG(IG)
      ZF=RC*SPB
      GF=SQRT(XF*XF+YF*YF)
      RF=SQRT(GF*GF+ZF*ZF)
C
C     (SET UP MATRIX T, THE TRANSFORMATION BETWEEN THE LINE OF SIGHT
C      SYSTEM AND THE FALSE HORIZON SYSTEM)
C
      T22=CT=X/G
      ST=Y/G
      T33=CP=G/R
      T13=SP=Z/R
      CS=COS(PSI)
      SS=SIN(PSI)
      CA=VG/V
      SA=VZ/V
      CG=VX/VG
      SG=VY/VG
      T11=CT*CP
      T12=ST*CP
      T21=-ST
      T31=-CT*SP
      T32=-ST*SP
C
C     (SET UP FALSE HORIZON SYSTEM VELOCITY COMPONENTS)
C
      VXP=T11*VX+T12*VY+T13*VZ
      VYP=T21*VX+T22*VY
      VZP=T31*VX+T32*VY+T33*VZ
      VGP=SQRT(VXP*VXP+VYP*VYP)
      CAP=VGP/V
      SAP=VZP/V
      CBP=VXP/VGP
      SBP=VYP/VGP
C
C     (SET UP UNIT VECTOR OUT LEFT WING OF AIRCRAFT)
C
      UX=-SA*CG*SS-SG*CS
      UY= CG*CS-SA*SG*SS
      UZ= CA*SS
      UZP=T31*UX+T32*UY+T33*UZ
      IF(VXP)31,32,31
   32 CSP=-T11*UX-T12*UY-T13*UZ
      GO TO 33
   31 CSP=(VGP*(T21*UX+T22*UY)+UZP*VZP*SBP)/VXP
   33 SSP=UZP/CAP
C
```

```
C       (COMPUTE FALSE HORIZON SYSTEM MEAN AND STANDARD DEVIATION OF
C        ERROR IN DIVE AND COURSE ANGLE ESTIMATES)
C
        EMAP=SAP*(.3196*ABS(CBP)-.1859*ABS(SBP))
        ESAP=.04712+.08063*ABS(SAP)*(1.0+1.16*ABS(CBP))
        EMBP=.4060*CAP*SBP*CBP
        ESBP=(.1670-.08098*ABS((CBP*CBP-SBP*SBP)*CSP)+
       1     .09006*ABS(SBP*SSP*CSP))/CAP
        SEMAP=SIN(EMAP)
        CEMAP=COS(EMAP)
        SEMBP=SIN(EMBP)
        CEMBP=COS(EMBP)
C       THE NEXT CARD ELIMINATES AN EQUIVALENCE BY USING A DOUBLE
C           REPLACEMENT.
        A33=SABP=SAP*CEMAP+CAP*SEMAP
        CABP=CAP*CEMAP-SAP*SEMAP
        SBBP=SBP*CEMBP+CBP*SEMBP
        CBBP=CBP*CEMBP-SBP*SEMB
C
C       (LIMIT VELOCITY ASSESSMENT (MECHANICAL COMPUTERS))
C
        VBP=AMIN1(VMAX,AMAX1(VMIN,V))
        ESVP=ESVPCT*V
C
C       SET UP THE ELEMENTS OF THE MATRIX A.
C       A CONTAINS THE PARTIALS OF VXE,VYE,VZE W.R.T. ALPHA,BETA,SPEED
C
        A31=CABP*CBBP
        A32=CABP*SBBP
        A21=-VBP*A32
        A22= VBP*A31
        A11=-VBP*SABP*CBBP
        A12=-VBP*SABP*SBBP
        A13= VBP*CABP
C
C       COMPUTE MEAN ESTIMATED VELOCITY COMPONENTS (MECHANICAL
C        COMPUTATION)
C
        VXE=(A31*T11+A32*T21+A33*T31)*VBP
        VYE=(A31*T12+A32*T22+A33*T32)*VBP
        VZE=(A31*T13        +A33*T33)*VBP
        GO TO 63
C
C       COMPUTE MEAN ASSUMED TIME OF FIRE AIRCRAFT POSITION (ELECTRONIC
C        COMPUTATION)
C
     56 XF=RANS*CTBCPB
        YF=RANS*STBCPB
```

```
      ZF=RANS*SPB
      GF=RANS*CPB
      RF=RANS
C
C  ITERATION TO DETERMINE MEAN THEORETICAL INTERCEPT POINT
C
   63 RS=0.0
      VS=VMUZZ
      T=0.0
   21 XE=XF+VXE*T
      YE=YF+VYE*T
      ZE=ZF+VZE*T
      XE2=XE*XE
      YE2=YE*YE
      ZE2=ZE*ZE
      GE2=XE2+YE2
      RE2=GE2+ZE2
      RE=SQRT(RE2)
      RC=RE-RS
      IF(RC.LT.1.C)GO TO 22
      VD=VS-(XE*VXE+YE*VYE+ZE*VZE)/RE
      IF(VD.LE.1.C)GO TO 64
      T=T+RC/VD
      IF(T.GT.TTFMAX)GC TO 64
      RS=RSHELL(T)
      VS = VSHELL(T)
      GC TO 21
   22 T2=T*T
C
C      CHANGE   22 JAN  76
C         IF INTERCEPT POINT BELOW MASK*****SKIP FIRE
C
      GE= SQRT(GE2)
      IF(ATAN2(ZE,GE).LE. AMASK)  GO  TC 64
C
C  ITERATION TO DETERMINE ACTUAL INTERCEPT POSITICN, RANGE, AND TIME
C
      TU=AMIN1(TFMAX,TMAX-TIME)
   23 CALL RPLANE(TU)
      IF(RSHELL(TU).GT.RA)GO TO 24
C
C     (SKIP FIRE ATTEMPT IF SHELL CANNCT CATCH AIRCRAFT)
C
      IF((XA*GETVAL(VXFPA)+YA*GETVAL(VYFPA)+ZA*GETVAL(VZFPA))/RA .LT.
     1   VSHELL(TU))GO TO 64
      TU=TU-1.0
      IF(TU)64,64,23
   24 TL=0.0
```

```
   25 T=0.5*(TL+TU)
      CALL RPLANE(T)
      RC=RA-RSHELL(T)
      IF(RC.GT.1.0)GO TO 26
      IF(RC.GT.-1.0)GO TO 37
      TU=T
      GC TO 25
   26 TL=T
      GC TO 25
   37 Q0=VS*RE-XE*VXE-YE*VYE-ZE*VZE
      Q1=(VZE-VS*ZE/RE)/Q0
      Q2=(XE*VYE-YE*VXE)/Q0
C
C     COMPUTE THE PARTIAL DERIVATIVES OF BIG THETA
C
      DTTDX=Q2*XE-YE
      DTTDY=Q2*YE+XE
      DTTDZ=Q2*ZE
      DTTDR=(ZF*DTTDZ+  YF*DTTDY+XF*DTTDX)/RF
      DTTDT=            XF*DTTDY-YF*DTTDX
      DTTDP= GF*DTTDZ-(YF*DTTDY+XF*DTTCX)*ZF/GF
C
C     COMPUTE THE PARTIAL DERIVATIVES OF BIG PHI
C
      DPPDX=Q1*XE
      DPPDY=Q1*YE
      DPPDZ=Q1*ZE+1.0
      DPPDR=(ZF*DPPDZ+  YF*DPPDY+XF*DPPDX)/RF
      DPPDT=            XF*DPPDY-YF*DPPDX
      DPPDP= GF*DPPDZ-(YF*DPPDY+XF*DPPDX)*ZF/GF
      GE4=GE2*GE2
      GC TO (210,220,230,240),IOEM
C
C  COMPUTATIONS FCR MODE 1 OPERATION
C
  210 GC TO (211,212,213,214,215,999),IGT
C
C     TRACKING ERROR DISTRIBUTION SIZES (SPHERICAL COORDINATES)
C     (FOR GT 1, 2, OR 3)
C
  211 CCNTINUE
  212 CONTINUE
  213 SR2=(123.0+0.0225*R)**2
      ST2=(.0643*TD)**2
      SP2=(.1320*PD)**2
      GC TO 219
C
C     (FOR GT 4 AND 5)
```

```
C
  214 CONTINUE
  215 SR2=(123.0+0.0225*R)**2
      ST2=(0.0167-.000710/(.0517+ABS(TD)))**2
      SP2=(0.0116-.000216/(.0235+ABS(ABS(PD)-4.0*PDD)))**2
C
C     SET UP THE ELEMENTS OF THE MATRIX B=AT
C
  219 B11=A11*T11+A12*T21+A13*T31
      B12=A11*T12+A12*T22+A13*T32
      B13=A11*T13        +A13*T33
      B21=A21*T11+A22*T21
      B22=A21*T12+A22*T22
      B23=A21*T13
      B31=A31*T11+A32*T21+A33*T31
      B32=A31*T12+A32*T22+A33*T32
      B33=A31*T13        +A33*T33
C
C     COMPUTE THE PARTIAL DERIVATIVES OF BIG THETA AND BIG PHI W.R.T.
C     ON CARRIAGE INPUTS (ALPHA, BETA, SPEED)
C
      DTTDAP=B11*DTTDX+B12*DTTDY+B13*DTTDZ
      DTTDBP=B21*DTTDX+B22*DTTDY+B23*DTTDZ
      DTTDVP=B31*DTTDX+B32*DTTDY+B33*DTTDZ
      DPPDAP=B11*DPPDX+B12*DPPDY+B13*DPPDZ
      DPPDBP=B21*DPPDX+B22*DPPDY+B23*DPPDZ
      DPPDVP=B31*DPPDX+B32*DPPDY+B33*DPPDZ
C
C     COMPUTE THE VARIANCES OF BIG THETA AND BIG PHI
C
      STT2=((DTTDR**2)*SR2  +(DTTDT**2)*ST2  +(DTTDP**2)*SP2
     1    +((DTTDAP*ESAP)**2+(DTTDBP*ESBP)**2+(DTTDVP*ESVP)**2)*T2)/GE4
      SPP2=((DPPDR**2)*SR2  +(DPPDT**2)*ST2  +(DPPDP**2)*SP2
     1    +((DPPDAP*ESAP)**2+(DPPDBP*ESBP)**2+(DPPDVP*ESVP)**2)*T2)/GE2
      GO TO 29
C
C  COMPUTATIONS FOR MODE 2, 3, OR 4 OPERATION
C
  220 GO TO (999,999,223,999,225,226),IGT
C
C     TRACKING ERROR DISTRIBUTIONS SIZES (SPHERICAL COORDINATES)
C     (FOR MODE 2)
C
  223 CONTINUE
  225 CONTINUE
  226 SR2=(41.0+0.0075*R)**2
      ST2=(.000982+.1681*TD*TD)**2
      SP2=(.000491+.033*ABS(ABS(PD)-4.0*PDD))**2
```

```
      GC TO 65
  230 GO TO (999,999,233,999,235,236),IGT
C
C     (FOR MODE 3)
C
  233 CONTINUE
  235 CCNTINUE
  236 SR2=(17.0+0.24*ABS(RDD)+0.018*RDD*RDD)**2+SC2RJ
      ST2=(0.00196+0.050*TD)**2
      SP2=(0.000982+0.11*ABS(ABS(PD)-2.0*PDD))**2+SP2MP
      GC TO 65
  240 GO TO (999,999,243,999,245,246),IGT
C
C     (FOR MODE 4)
C
  243 CCNTINUE
  245 CONTINUE
  246 SR2=(17.0+0.24*ABS(RDD)+0.018*RDD*RDD)**2+SD2RJ
      ST2=(0.000982+0.1681*TD*TD)**2
      SP2=(0.000491+0.033*ABS(ABS(PD)-4.C*PDD))**2+SP2MP
C
   65 RBTD=RANS*THESD
      RBPD=RANS*PHISD
C
C     VELOCITY COMPONENT ERROR DISTRIBUTION SIZES
C
      SVX2=(SR2*(PHISD*CTBSPB+THESD*STBCPB)**2
     1      +ST2*(RBPD*STBSPB-RBTD*CTBCPB-RANSD*STBCPB)**2
     2      +SP2*(RBPD*CTBCPB-RBTD*STBSPB+RANSD*CTBSPB)**2)*ATLCON
      SVY2=(SR2*(PHISD*STBSPB-THESD*CTBCPB)**2
     1      +ST2*(RBPD*CTBSPB+RBTD*STBCPB-RANSD*CTBCPB)**2
     2      +SP2*(RBPD*STBCPB+RBTD*CTBSPB+RANSD*STBSPB)**2)*ATLCON
      SVZ2=(SR2*(PHISD*CPB)**2+SP2*(RBPD*SPB-RANSC*CPB)**2)*ATLCON
C
C     CCMPUTE THE VARIANCES OF BIG THETA AND BIG FHI
C
      STT2=((DTTDR**2)*SR2 +(DTTDT**2)*ST2 +(DTTDP**2)*SP2
     1    +((DTTDX**2)*SVX2+(DTTDY**2)*SVY2+(DTTDZ**2)*SVZ2)*T2)/GE4
     1+SD2J
      SPP2=((DPPDR**2)*SR2 +(DPPDT**2)*ST2 +(DPPDP**2)*SP2
     1    +((DPPDX**2)*SVX2+(DPPDY**2)*SVY2+(DPPDZ**2)*SVZ2)*T2)/GE2
     1+SD2J
C
C   COMPUTATION OF VULNERABLE AREA OF AIRCRAFT AT INTERCEPT
C
   29 VP=VSHELL(T)
      XU=XE/RE
      YU=YE/RE
```

```
      ZU=ZE/RE
      XE=XU*RA
      YE=YU*RA
      ZE=ZU*RA
      GE=SQRT(XE*XE+YE*YE)
      VXA=GETVAL(VXFPA)
      VYA=GETVAL(VYFPA)
      VZA=GETVAL(VZFPA)
      VGA=SQRT(VXA*VXA+VYA*VYA)
      VA =SQRT(VGA*VGA+VZA*VZA)
      VXI=VP*XU-VXA
      VYI=VP*YU-VYA
      VZI=VP*ZU-VZA
      VI=SQRT(VXI*VXI+VYI*VYI+VZI*VZI)
      ALFA=GETVAL(AFPA)
      CA=COS(ALFA)
      SA=SIN(ALFA)
      BETA=BFPA(INDEX1)+FRACT*ANGLIM(BFPA(INDEX2)-BFPA(INDEX1))
      CG=COS(BETA)
      SG=SIN(BETA)
      PZI=PFPA(INDEX1)+FRACT*ANGLIM(PFPA(INDEX2)-PFPA(INDEX1))
C     THE NEXT CARDS ELIMINATE AN EQUIVALENCE BY USING A DOUBLE
C         REPLACEMENT.
      T33=CP=COS(PZI)
      T13=SP=SIN(PZI)
      Q1=VXI*CG+VYI*SG
      Q2=VZI*CA-Q1*SA
      Q3=VYI*CG-VXI*SG
      VXF=Q1*CA+VZI*SA
      VYF=Q2*SP+Q3*CP
      VZF=Q2*CP-Q3*SP
C
C     (SET UP INDICES FOR VULNERABLE AREA INTERPOLATION)
C
      F1=ATAN2(VYF,VXF)/QTRPI
      IF(F1.LT.0.0)F1=F1+8.0
      I1=F1
      F1=F1-FLOAT(I1)
      I1=I1+1
      F2=ACOS(VZF/VI)/QTRPI
      I2=F2
      F2=F2-FLOAT(I2)
      I2=I2+1
      F3=AMIN1(7.999999999,VI/152.4)
      I3=F3
      F3=F3-FLOAT(I3)
      I3=I3+1
      D1=1.0-F1
```

```
      D2=1.0-F2
      D3=1.0-F3
      J1=I1+1
      J2=I2+1
      J3=I3+1
C
C     (PERFORM LINEAR THREE DIMENSIONAL INTERPOLATION)
C
      AVT=D3*(D2*(D1*VAT(I1,I2,I3)+F1*VAT(J1,I2,I3))+
     1          F2*(D1*VAT(I1,J2,I3)+F1*VAT(J1,J2,I3)))+
     2    F3*(D2*(D1*VAT(I1,I2,J3)+F1*VAT(J1,I2,J3))+
     3          F2*(D1*VAT(I1,J2,J3)+F1*VAT(J1,J2,J3)))
C
C   SET UP DISTRIBUTION SIZES OF OTHER SCURCES OF RANCOM ERROR
C
      SVA=XU*VXA+YU*VYA+ZU*VZA
      CVA2=VA*VA-SVA*SVA
      VMQ=.99*VMUZZ/RA-ASHCON
      DTI=(VMQ-SQRT(VMQ*VMQ-4.0*BSHCON))/(2.0*BSHCON)-T
      SLXMV2=CVA2*(DTI*VP/(VP-SVA/.99))**2
      SLYFR2=(0.010*VA*T)**2
      SLXFR2=SLYFR2*(1.0+CVA2/(VP-SVA)**2)
      SACAP2=(0.0C3*RA)**2
      SAOGJ2=(0.005*RA)**2
      SACBD2=(BDACCN(IGT)*RA)**2
      IF(IOEM.EQ.1)GO TO 68
      SAOPE2=(0.0C2*RA)**2
      GC TO 67
   68 SAOPE2=(V*V-((X*VX+Y*VY+Z*VZ)/R)**2)*
     1         RA2*(0.0001463-7.478E-11*(R-1386.0)**2)**2
   67 CDIST=SAOAP2+SAOGJ2+SAOPE2+SAOBD2
C
C   CCMBINE ALL ERRORS INTO CNE DISTRIBUTION, COMPUTE BIAS
C
      SXA2=STT2*RA2
      SYA2=SPP2*RA2
      SXL2=CDIST+SLXMV2+SLXFR2
      SYL2=CDIST+SLYFR2
      CTT=XE/GE
      STT=YE/GE
      CPP=GE/RE
      SFP=ZE/RE
      BXA=XA*STT-YA*CTT
      BYA=ZA*CPP-(YA*STT+XA*CTT)*SPP
      BXA2=BXA*BXA
      BYA2=BYA*BYA
      VAM=VXA*STT-VYA*CTT
      VAP=VZA*CPP-(VYA*STT+VXA*CTT)*SPP
```

```
      VAM2=VAM*VAM
      VAP2=VAP*VAP
      VAI2=VAM2+VAP2
      CD2=VAM2/VAI2
      SC2=VAP2/VAI2
      SXAT2=SXA2+CD2*SXL2+SD2*SYL2
      SYAT2=SYA2+CD2*SYL2+SD2*SXL2
      TWOCOV=2.0*VAM*VAP*(SXL2-SYL2)/VAI2
      DIF=SXAT2-SYAT2
      DEN=2.0*SQRT(TWOCOV*TWOCOV+DIF*DIF)
      HC2Z=DIF/DEN
      CZ2=0.5+HC2Z
      SZ2=0.5-HC2Z
      SZCZ=TWOCOV/DEN
      STUFF=2.0*SZCZ*BXA*BYA
      BXF2=CZ2*BXA2+SZ2*BYA2+STUFF
      BYF2=CZ2*BYA2+SZ2*BXA2-STUFF
      SXF2=CZ2*SXAT2+SZ2*SYAT2+SZCZ*TWOCOV
      SYF2=CZ2*SYAT2+SZ2*SXAT2-SZCZ*TWOCCV
      AVTPI=AVT/PI2
C
C     COMPUTE PROBABILITY OF KILL
C
      STUFF=BXF2/(SXF2+AVTPI)+BYF2/(SYF2+AVTPI)
      IF(STUFF.LT.50.0)GO TO 75
      PK=0.0
      GO TO 78
   75 PK=AMIN1(1.0,EXP(-.5*STUFF)*AVTPI/SQRT((SXF2+AVTPI)*(SYF2+AVTPI)))
   78 PS=(1.0-PK)**ISB
      PK=1.0-PS
      TI=TIME+T
C
C     ACCUMULATE PK AS A FUNCTION OF INPUT TIME INTERVALS
C
      I=0
   50 I=I+1
      IF(TIME.GE.TINTER(I))GO TO 50
      J=I
   51 IF(TI.LT.TINTER(J))GC TO 52
      J=J+1
      GO TO 51
   52 PTOTTF(I)=PK+PS*PTOTTF(I)
      PTOTTI(J)=PK+PS*PTOTTI(J)
      CPS=CPS*PS
C
C     ACCUMULATE PK FOR EACH SPHERICAL SECTOR
C
      SPKT(I1,I2,I3)=PK+PS*SPKT(I1,I2,I3)
```

```
C
C     CCMPUTE QUANTITIES FOR EXTENDED OUPUT,  WHEN DESIRED
C
      IF(IPRINT(6).LE.0)GO TO 20
      C1=THESD*DEGREE
      O2=PHISD*DEGREE
      C3=ETHE4*DEGREE
      C4=EPHI4*DEGREE
      O5=SQRT(BXF2+FUZZ)
      O6=SQRT(BYF2+FUZZ)
      C7=SQRT(SXF2)
      O8=SQRT(SYF2)
      O9=1.0-CPS
C
C     WRITE EXTENDED OUTPUT
C
      CALL PAGES(1,5,JP)
      IF (JP.EQ.0) WRITE (6,1013) ISL,IGT,IEM,XGUN,YGUN,ZGUN,CIRCLE
      WRITE(6,1014)IG,ICEM,TIME,T,TI,R,RA,O7,O8,O5,O6,VI,O1,O2,O3,O4,
     1             AVT,PK,O9
   20 NROUND=NROUND+ISB
C
C   FIRE ADDITIONAL GUNS IN COMPLEX, IF ANY
C
   64 IG=IG+1
      IF(IG.GT.IGL)IG=1
      TFIRE=TFIRE+TPERS
      IF(TIME.GT.TFIRE)GO TO 54
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
C                                                                     C
C                 TTTTT  RRRR     A     CCC   K   K                   C
C                   T    R   R   A A   C   C  K  K                    C
C                   T    RRRR   A   A  C      KKK                     C
C                   T    R  R   AAAAA  C   C  K  K                    C
C                   T    R   R  A   A   CCC   K   K                   C
C                                                                     C
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
   62 TIME=TIME+0.064
      IF(TIME.GT.TMAX)GO TO 69
C
C     SWITCH TO MCDE 1 TRACKING IF JAMMING IS ABOVE THRESHOLD OR IF
C     RANGE IS TOC CLOSE
C
      ICEM = IEM
      SD2J = 0.
      SC2RJ = 0.
      IF(R.LT.RSMCDE) GO TO 501
      IF(IJAM.EQ.0) GO TO 502
```

```
C
      CALL ECM2
C
      IF(SJT.GT.SJTMAX) GO TO 501
      IF(IOEM.EQ.3)CALL JAMER2(IRECM,SJT,SD2J)
      IF(IOEM.EQ.4) SD2RJ=SD2RJM
      IF(IRECM.EQ.3) SD2RJ = SD2RJM
      GO TO 502
  501 IOEM = 1
  502 CONTINUE
      IF(IJAM.EQ.0) GO TO 53
      IF(IP.EQ.0) GO TO 53
      IF( (ILOOP/IP)*IP.NE.ILOOP) GO TO 53
      DUM = 10.*ALOG10(GJ)
      WRITE(11,1044) TIME,R,XSEC,DUM,SJT,IOEM,SD2J,SD2RJ,SN
C
C  COMPUTE MEAN TRACKING ERRORS
C
   53 GO TO(310,320,330,340),IOEM
C
C     (MODE 1, GT 1 - 5)
C
  310 GO TO (311,312,313,314,315,999),IGT
  311 CONTINUE
  312 CONTINUE
  313 CONTINUE
  314 CONTINUE
  315 THESD=1.11*TD+0.9*TDD+6.0*ETHE
      PHISD=1.10*PD-0.7*PDD+6.0*EPHI
      RANSD=RD+3.0*ERAN
      GO TO 73
C
C     (MODE 2, GT 3, 5, AND 6)
C
  320 GO TO (999,999,323,999,325,326),IGT
  323 CONTINUE
  325 CONTINUE
  326 THESD=0.91*TD+0.45*TDD+6.0*ETHE
      PHISD=0.75*PD-0.25*PDD+6.0*EPHI
      RANSD=RD+3.0*ERAN
      GO TO 73
C
C     (MODE 3, GT 3, 5, AND 6)
C
  330 GO TO (999,999,333,999,335,336),IGT
  333 CONTINUE
  335 CONTINUE
  336 THESD=TD+6.0*ETHE
```

```
      PHISD=PD+6.C*EPHI
      RANSD = 0.804*RD + 3.0*ERAN
      GO TO 73
C
C     (MODE 4, GT 3, 5, AND 6)
C
  340 GO TO (999,999,343,999,345,346),IGT
  343 CONTINUE
  345 CONTINUE
  346 THESD=0.910*TD+0.45*TDD+6.0*ETHE
      PHISD=0.75*PD-0.25*PDD+6.0*EPHI
      RANSD = 0.804*RD + 3.0*ERAN
C
C     (LIMIT SLEW RATES AND ELEVATION ANGLE TO WEAPCN MAXIMUMS)
C
   73 THESD=SIGN(AMIN1(TDMAX,ABS(THESD)),THESD)
      PHISD=SIGN(AMIN1(PDMAX,ABS(PHISD)),PHISD)
      THES=ANGLIM(THES+0.064*THESD)
      PHIS=AMAX1(PHMIN,AMIN1(PHMAX,PHIS+0.064*PHISD))
      RANS=AMAX1(0.0,RANS+0.064*RANSD)
      CTB=COS(THES)
      STB=SIN(THES)
      CPB=COS(PHIS)
      SPB=SIN(PHIS)
      CTBCPB=CTB*CPB
      CTBSPB=CTB*SPB
      STBCPB=STB*CPB
      STBSPB=STB*SPB
      RCS=RD
      TCS=TD
      PCS=PD
      IF(IEM.LT.2)GO TO 60
C
C     CCMPUTE MEAN (SMOOTHED) VELOCITY CCMPONENTS (ELECTRONIC
C      COMPUTATION)
C
      VXE=RANSD*CTBCPB-RANS*(STBCPB*THESD+CTBSPB*PHISD)
      VYE=RANSD*STBCPB+RANS*(CTBCPB*THESD-STBSPB*PHISD)
      VZE=RANSD*SPB+RANS*CPB*PHISD
      VXE=VXE+EMDTA*(VXES-VXE)
      VYE=VYE+EMDTA*(VYES-VYE)
      VZE=VZE+EMDTA*(VZES-VZE)
      VXES=VXE
      VYES=VYE
      VZES=VZE
      GO TO 60
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
C                                                                      C
```

```
C              OOO    U   U  TTTTT  PPPP   U   U  TTTTT            C
C             O   O   U   U    T    P   P  U   U    T              C
C             O   O   U   U    T    PPPP   U   U    T              C
C             O   O   U   U    T    P      U   U    T              C
C              OOO     UUU     T    P       UUU     T              C
C                                                                  C
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
   69 DC 92 I=1,4
   92 IFLAGS(I)=IFLAGS(I)+IPRINT(I)
C
C     PRINT PK AS A FUNCTICN OF AIRCRAFT ASPECT AND IMPACT SPEED
C
      IF(IPRINT(5).EQ.0)GO TO 80
      CALL PRSEGS(SPKT2,ISL)
C
C     COMPUTE PK AS A FUNCTION OF ASPECT AND IMPACT SPEED FOR ALL GUNS
C
   80 DC 36 I=1,32
      DC 36 J=1,8
      PK=RHO(1)*SPKT2(I,J)
   36 SPKTOT(I,J)=PK+(1.0-PK)*SPKTOT(I,J)
C
C     STORAGE OF PK VS DENSITY FACTOR AND TIME INTERVALS (AT FIRE AND
C        INTERCEPT) PER WEAPON OR WEAPON COMPLEX
C
      CPK=1.0-CPS
      DC 55 I=1,NRHOS
      D=RHO(I)
      PK=D*CPK
      PKTTDC(I)=PK+(1.0-PK)*PKTTDC(I)
      DC 55 J=1,NTINTS
      D1=D*PTOTTF(J)
      PKTFDC(J,I)=D1+(1.0-D1)*PKTFDC(J,I)
      D2=D*PTOTTI(J)
   55 PKTIDC(J,I)=D2+(1.0-D2)*PKTIDC(J,I)
C
C     COMPUTE, STORE, AND WRITE TOTAL PKS FOR ENTIRE ARRAY CF WEAPCNS
C
      F=FLOAT(NROUND/ISB)*TPERS
      WRITE(7)ISL,IGT,IEM,ICB,ISB,IGL,XGUN,YGUN,ZGUN,TREACT,TTRACK,
     1 CIRCLE,NROUND,F,CPK,NRHOS,RHO,NTINTS,TINTER,PTOTTF,PTOTTI,IPRINT
      ISL=ISL+1
      ASSIGN 70 TC IEOF
      GC TO 15
   70 ENDFILE 7
      LINE=66
      REWIND 7
C     PUNCH2 CARDS WRITE ONLY ONE CARD IMAGE ON TAPE4 WHEN THERE IS
```

```
C        ONLY ONE DEFENSE PER EMPLOYMENT (I.E., ONLY ONE "12" CARD
C        BEFORE 7/8/9 END-OF-RECORD).
      K = ISL
      CALL PAGES(4,0,JP)
      WRITE (6,1033)
      ASSIGN 40 TC IEOF
   79 READ(7) ISL,IGT,IEM,ICB,ISB,IGL,XGUN,YGUN,ZGUN,TREACT,TTRACK,
     1 CIRCLE,NROUND,F,CPK,NRHOS,RHO,NTINTS,TINTER,PTOTTF,PTOTTI,IPRINT
      IF (EOF(7).NE.0.) GO TO IEOF,(4,12,40,70,83,9997,9999)
      IF (IOCHEC(7).NE.0.) GO TO IERR,(3,28,9996)
      CALL PAGES(1,4,JP)
      IF (JP.EQ.0) WRITE (6,1033)
      WRITE (6,1034) ISL,CPK,NROUND,F,XGUN,YGUN,ZGUN,CIRCLE,IGL,
     1     TREACT,TTRACK,IGT,IEM,ICB,ISB,ISL
      WRITE (4,1060) ITITLE(9),ITITLE(10),ISL,IGT,IEM,ICB,ISB,IGL,CPK,
     1     NROUND,XGUN,YGUN,ZGUN,F,NUMBER
      GO TO 79
   40 IF (K.NE.2) WRITE (4,1064) ITITLE(9),ITITLE(10),PKTTDC(1),NUMBER
      IF (IFLAGS(2).LE.0) GO TO 76
      REWIND 7
      CALL PAGES(4,0,JP)
      WRITE (6,1031) (I,I=1,10)
   77 READ(7) ISL,IGT,IEM,ICB,ISB,IGL,XGUN,YGUN,ZGUN,TREACT,TTRACK,
     1 CIRCLE,NROUND,F,CPK,NRHOS,RHO,NTINTS,TINTER,PTOTTF,PTOTTI,IPRINT
      IF(IPRINT(2).LE.0)GO TO 77
      CALL PAGES(1,4,JP)
      IF (JP.EQ.0) WRITE (6,1031) (I,I=1,10)
      WRITE(6,1032)ISL,(TINTER(I),I=1,NTINTS)
      IFLAGS(2)=IFLAGS(2)-IPRINT(2)
      IF(IFLAGS(2).GT.0)GO TO 77
   76 IF(IFLAGS(3).LE.0)GO TO 42
      REWIND 7
      CALL PAGES(4,0,JP)
      WRITE (6,1035) (I,I=1,10)
   41 READ(7) ISL,IGT,IEM,ICB,ISB,IGL,XGUN,YGUN,ZGUN,TREACT,TTRACK,
     1 CIRCLE,NROUND,F,CPK,NRHOS,RHO,NTINTS,TINTER,PTOTTF,PTOTTI,IPRINT
      IF(IPRINT(3).LE.0)GO TO 41
      CALL PAGES(2,4,JP)
      IF (JP.EQ.0) WRITE (6,1035) (I,I=1,10)
      WRITE(6,1018)ISL,(PTOTTF(I),I=1,NTINTS)
      DO 410 I=2,NTINTS
  410 PTOTTF(I) = PTOTTF(I-1) + (1.0-PTOTTF(I-1))*PTOTTF(I)
      WRITE (6,1058) ISL,(PTOTTF(I),I=2,NTINTS)
      IFLAGS(3)=IFLAGS(3)-IPRINT(3)
      IF(IFLAGS(3).GT.0)GO TO 41
   42 IF(IFLAGS(4).LE.0)GO TO 71
      REWIND 7
      CALL PAGES(4,0,JP)
```

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      WRITE (6,1036) (I,I=1,10)
   43 READ(7) ISL,IGT,IEM,ICB,ISB,IGL,XGUN,YGUN,ZGUN,TREACT,TTRACK,
     1 CIRCLE,NROUND,F,CPK,NRHOS,RHO,NTINTS,TINTER,PTOTTF,PTOTTI,IPRINT
      IF(IPRINT(4).LE.0) GO TO 43
      CALL PAGES(2,4,JP)
      IF (JP.EQ.0) WRITE (6,1036) (I,I=1,10)
      WRITE(6,1018)ISL,(PTOTTI(I),I=1,NTINTS)
      DO 430 I=2,NTINTS
  430 PTOTTI(I) = PTOTTI(I-1) + (1.0-PTOTTI(I-1))*PTOTTI(I)
      WRITE (6,1058) ISL,(PTOTTI(I),I=2,NTINTS)
      IFLAGS(4)=IFLAGS(4)-IPRINT(4)
      IF(IFLAGS(4).GT.0)GO TO 43
   71 IF(IFLAGS(1).LE.0)GO TO 44
      REWIND 7
      CALL PAGES(4,0,JP)
      WRITE (6,1017) (I,I=1,9)
   74 READ(7) ISL,IGT,IEM,ICB,ISB,IGL,XGUN,YGUN,ZGUN,TREACT,TTRACK,
     1 CIRCLE,NROUND,F,CPK,NRHOS,RHO,NTINTS,TINTER,PTOTTF,PTOTTI,IPRINT
      IF(IPRINT(1).LE.0)GO TO 74
      CALL PAGES(1,4,JP)
      IF (JP.EQ.0) WRITE (6,1017) (I,I=1,9)
      WRITE(6,1059)ISL,(RHO(I),I=1,NRHOS)
      IFLAGS(1)=IFLAGS(1)-IPRINT(1)
      IF(IFLAGS(1).GT.0)GO TO 74
   44 CALL PAGES(7+NTINTS,0,JP)
      WRITE(6,1019)
      WRITE (6,1021) (I,I=1,9)
      PTOTTF(1) = PKTFDC(1,1)
      DO 440 I=1,NTINTS
      IF (I.EQ.1) GO TO 440
      PTOTTF(I) = PTOTTF(I-1) + (1.0-PTOTTF(I-1))*PKTFDC(I,1)
  440 WRITE (6,1018) I,PTOTTF(I),(PKTFDC(I,J),J=1,NRHOS)
      CALL PAGES (9+NTINTS,0,JP)
      WRITE(6,1020)
      WRITE (6,1021) (I,I=1,9)
      PTOTTI(1) = PKTIDC(1,1)
      DO 441 I=1,NTINTS
      IF (I.EQ.1) GO TO 441
      PTOTTI(I) = PTOTTI(I-1) + (1.0-PTOTTI(I-1))*PKTIDC(I,1)
  441 WRITE (6,1018) I,PTOTTI(I),(PKTIDC(I,J),J=1,NRHOS)
      WRITE (6,1023) (PKTTDC(I),I=1,NRHCS)
      CALL PRSEGS(SPKTOT,0)
      GO TO 95
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
C                                                                    C
C               EEEEE  X   X  IIIII  TTTTT   SSSS                    C
C               E       X X     I      T    S                        C
C               EEE      X      I      T     SSS                     C
```

```
C                  E        X X       I        T       S                        C
C                  EEEEE   X   X    IIIII      T    SSSS                        C
C                                                                               C
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
  999 WRITE(6,1027)IGT,IEM
      CALL EXIT
 9994 WRITE(6,1040)
      CALL EXIT
 9995 WRITE(6,1039)
      CALL EXIT
 9996 WRITE(6,1037)
      CALL EXIT
 9997 REWIND 4
      LINE = 66
      ITITLE(3)=10H *****  FI
      ITITLE(4)=10HNAL SUMMAR
      ITITLE(5)=10HY  *****
      ITITLE(1)=ITITLE(2)=ITITLE(6)=ITITLE(7)=1H
      CALL PAGES(3,0,JP)
      WRITE (6,1061)
  990 READ (4,1062) ICARD,IPRINT,I
      IF (EOF(4).NE.0.) GO TO 991
      CALL PAGES(1,3,JP)
      IF (JP.EQ.0) WRITE (6,1061)
      WRITE (6,1063) ICARD,IPRINT,I
      IF(ISW.NE.IOFF) CALL AVG(ICARD(3),IPRINT,ISW)
      GO TO 990
  991 REWIND 4
      CALL TIMREM(TI)
      CIO=CIO-TI+2.886
      CALL SECOND(TU)
      TU = TU + .C06
      CPU=TU-CPU+0.
      WRITE (6,1024) CPU,CIO,TU
      CALL EXIT
 9998 WRITE(6,1006)I,ICARD
      CALL EXIT
 9999 WRITE(6,1002)
      CALL EXIT
 1000 FORMAT(10E8.0)
 1001 FORMAT(* LOCATIO *,I5,6X,*GUN TYPE*,I2,6X,*ERRCR MCDE*,I2,9X,
     1 *POSITION=(*,F7.0,*,*,F7.0,*,*,F7.0,*)   RADIUS=*,F5.0,*M*/)
 1002 FCRMAT(//*-UNEXPECTED END-OF-RECORD/FILE ENCOUNTERED.*)
 1003 FORMAT(3X*TIME*,14X*XXX*,7X*YYY*,7X*ZZZ*,12X*SPEED*,6X*XDOT*,
     1     6X*YDOT*,6X*ZDOT*,10X*HEADING*,5X*CLIMB*,6X*ROLL*/)
 1004 FORMAT(1X,F6.2,7X,3F10.1,7X,4F10.2,7X,3F10.2)
 1005 FORMAT(//*0XR=*,F9.2,*   YR=*,F9.2,8X,*XT=*,F9.2,*   YT=*,F9.2,8X,
     1*PSI=*,F7.2,8X,*DZ=*,F9.2)
```

```
1006 FORMAT(////*-IMPROPER INPUT CARD ENCOUNTEREC.  "*,I2,7A10,A8,*"*)
1007 FORMAT(I2,7A10,A8)
1008 FORMAT(6X,9E8.0)
1009 FORMAT(1X,5I1,E8.0)
1010 FORMAT(*-VULNERABLE AREA (SQ. METERS) AS A FUNCTION OF IMPACT *,
    1     *SPEED (METERS/SEC) AND ASPECT VIEW*/5X,8A10//* VIEW*,7X*0
    2 152      305      457      610      762      914     1067      1219*/)
1011 FORMAT(1H-,I2,* TIME INTERVALS FOR PK ACCUMULATION*//4X*0.00*,
    1     10F8.2)
1012 FORMAT(I2,F7.3,3F7.2,3F6.2,F6.0,2F12.7,2F6.1,2F7.0,F8.2,2F8.3)
1013 FORMAT(* LOCATION*,I5,6X,*GUN TYPE*,I2,6X,*ERRCR MODE*,I2,6X,
    1*POSITION=(*,F8.1,*,*,F8.1,*,*,F8.1,*)    RADILS=*,F6.1,* M*/*OL
    2    FIRE     FLT.    INTCP    FIRE   INTCP*,31X,*CLCSE   AZIM.   ELEV.
    3 MEAN    MEAN    VULN*/* N DEM  TIME    TIME      TIME  RANGE  RANGE
    4SIG1   SIG2    BIAS1  BIAS2     VEL.      RATE     RATE   AZ.ERR EL.ERR
    5AREA    SHOT PK    CUM. PK*/)
1014 FORMAT(I2,I3,2F7.2,F8.2,2F7.0,1X,2F6.1,1X,2F7.1,F8.1,1X,2F7.2,1X,
    2     3F7.2,2F10.6)
1015 FCRMAT(3X,I1,1X,I1,9E8.0)
1016 FORMAT(6I1)
1017 FCRMAT(*- LCC*,12X,9(7X*RHO*,I2)/)
1018 FORMAT(I5,10F12.7)
1019 FCRMAT(*-ATTRITION ACCRUED AS A FUNCTION CF TIME OF FIRE*)
1020 FORMAT(*-ATTRITION ACCRUED AS A FUNCTION OF TIME AT INTERCEPT*)
1021 FORMAT(*OTIME*,5X*CUM FOR*,9(5X*DENSITY*)/* SEG.*,5X*CLASS 1*,
    1     9(5X*CLASS*,I2)/)
1023 FORMAT(1H0,10X,*TOTALS*,9F12.7)
1024 FORMAT(///*-END OF JOB.*,9X*EXECUTION CPU TIME *,F7.2,9X*EXEC*,
    1     *UTION (CPU + IO/2) TIME *,F7.2,9X*TOTAL CPU TIME *,F7.2)
1025 FORMAT(*OG   TIME/      MIN      MAX     AZIM   ELEV    MAX     MAX   MUZZ     B
    2ALLISTIC    BALLISTIC    VEL      VEL    RANGE   RANGE   SMOOTH   MAX.AZ   MA
    3X.EL*/ * T  ROUND     ELEV     ELEV     RATE   RATE   TOF1   TOF2    VEL    CO
    4NSTANT 1  CONSTANT 2    MIN     MAX      MIN      MAX     CCNST    ERROR    E
    5RROR*/)
1026 FORMAT(I5,4X,*0.00*,8F8.2)
1027 FORMAT(////*-GUN TYPE*,I2,*,  ERRCR MODE*,I2,*.  COMBINATICN INVAL
    1IC.*)
1028 FORMAT(I4,I2,9E8.0)
1029 FORMAT(1H-,I1,* DENSITY CLASSES FOR PK ACCUMULATION*//9F12.5)
1031 FCRMAT(*- LOC*,10(6X,*TIME*,I2)/)
1032 FCRMAT(I5,10F12.2)
1033 FORMAT(*- LCC*,5X*P(KILL)*,6X*ROUNDS*,3X*FIRE TIME*,8X*XGUN*,
    1     8X*YGUN*,8X*ZGUN   RADIUS GL*,5X*T REACT*,5X*T TRACK*,
    2     * GT EM CB SB  LOC*)
1034 FORMAT(I5,F12.7,I12,4F12.2,F9.2,I3,2F12.2,4I3,I5)
1035 FORMAT(*- LCC*,10(4X,*PK(TF*,I2,*)*)/)
1036 FORMAT(*- LOC*,10(4X,*PK(TI*,I2,*)*)/)
1037 FORMAT(////*-UNRECOVERABLE PARITY ERROR DETECTED.  CALL EXIT.*)
```

```
1038 FORMAT(I3,I5,F10.0)
1039 FORMAT(* ECM SHOULD NOT BE SPECIFIED WHEN IEM IS 1 OR 2 *)
1040 FORMAT(* MULTIPATH TRACKING ERROR SPECIFIED WITH IEM=3 ONLY *)
1041 FORMAT(I3,I3,I2,3F10.0,I5,2F10.0,I5,F10.0)
1042 FORMAT(//,* ECM VARIABLES*)
1043 FORMAT(*1AAASIM----*,10A10)
1044 FORMAT(1X,F7.2,4X,F8.0,2X,F9.2,5X,F7.2,5X,F7.2,
    15X,I2,3X,E10.4,5X,E10.4,5X,F7.2)
1045 FORMAT(//,
    1*  FIRE TIME  RANGE(M)   X-SEC(SQM)  JAM.GAIN(DB)   J/S(DB)*,
    2*  MODE  ADD.TRK.VAR.  ADD.RNG.VAR.    S/N(DB)*)
1058 FORMAT(I5,*CUM*,9X,9F12.7)
1059 FORMAT(I5,12X,9F12.5)
1060 FORMAT(2A9,I3,5I2,F10.7,I5,2F7.0,F6.0,F6.1,I6)
1061 FORMAT(1H0,4X*DATE*,7X*TIME* 4X*LCC  GT   EM  CB  SB  GL*,5X*P(K*,
    1    *ILL)   RDS    XGUN    YGUN     ZGUN  F TIME     PAGE*/)
1062 FORMAT(2A9,A3,5A2,A10,A5,2A7,3A6)
1063 FORMAT(2(2X,A9),2X,A3,5(2X,A2),2X,A10,1X,A5,2(1X,A7),3(2X,A6))
1064 FORMAT(2A9,13X,F10.7,31X,I6)
     END
     SUBROUTINE PAGES(N,NT,JP)
C
C    KEEPS NUMBER OF LINES PER PAGE LESS THAN 59, PRINTS HEADER,
C        AND GETS TIME INFORMATION FROM SYSTEM.  REPLACES
C        NPAGE(MAX) AND HEADER IN AFATL PROGRAM.
C
C    N         NUMBER OF LINES TO BE PRINTED BEFORE NEXT CALL TO PAGES.
C    NT        NUMBER OF LINES IN TITLE OR HEADER OF DATA BEING PRINTED.
C              IF CALL TO PAGES IS TO PRINT HEADER ONLY, "N" SHOULD
C              BE NUMBER OF LINES AND "NT" SHOULD BE ZERO.
C    JP        FLAG FROM PAGES, SET TO ZERO WHEN A NEW PAGE IS STARTED
C              INDICATING NECESSITY TO PRINT HEADER.
     COMMON /BLOCK1/ ITITLE(10)
     COMMON /HEADFO/ LINE,NUMBER
     JP = 2
     LINE = LINE + N
     IF (LINE .LT. 59) RETURN
     NUMBER = NUMBER + 1
     CALL TIME(ITITLE(10))
     WRITE (6,1000) ITITLE,NUMBER
     LINE = 2 + N + NT
     JP = 0
     RETURN
1000 FORMAT(*1AFATL P-C01 AAASIM  "*,7A10,*"*,A10,2(1XA9),4X*PAGE*,I4/)
     END
     SUBROUTINE PRSEGS(P,ISL)
C
C    PRINTS THE PK AS A FUNCTION OF ASPECT AND IMPACT SPEED TABLES
```

```
C
C     THIS SUBROUTINE EXTENSIVELY MODIFIED TO PRINT ASPECT SECTOR
C         ANGLES AND PROPERLY LABEL THE TWO CASES FOR WHICH IT
C         PRINTS TABLES.
      COMMON /BLOCK3/ XGUN,YGUN,ZGUN
      COMMON /BLOCK4/ IGT,IEM,ICB,ISB,IGL,CIRCLE
      DIMENSION P(32,8),PT(8),ANG(8)
      DATA ANG/7H315-360,7H000-045,7H045-090,7H090-135,7H135-180,
     1         7H180-225,7H225-270,7H270-315/
      PK=PT(1)=PT(2)=PT(3)=PT(4)=PT(5)=PT(6)=PT(7)=PT(8)=0.0
      CALL PAGES(6,0,JP)
      IF (ISL.GT.0) WRITE (6,1001) ISL,IGT,IEM,XGUN,YGUN,ZGUN,CIRCLE
      IF (ISL.EQ.0) WRITE (6,1030)
      WRITE(6,1040)
      DO 2 I=1,32
      IAZ = 1 + MOD(I,8)
      IEL = 2 + (I-1)/8
      PP=0.0
      DO 3 J=1,8
      PT(J)=PT(J)+(1.0-PT(J))*P(I,J)
      PK = PK + (1.0-PK) * P(I,J)
    3 PP=PP+(1.0-PP)*P(I,J)
      CALL PAGES(1,6,JP)
      IF (JP.NE.0) GO TO 2
      IF (ISL.GT.0) WRITE (6,1001) ISL,IGT,IEM,XGUN,YGUN,ZGUN,CIRCLE
      IF (ISL.EQ.0) WRITE (6,1030)
      WRITE (6,1040)
    2 WRITE (6,1041) I,ANG(IAZ),ANG(IEL),(P(I,J),J=1,8),PP
      CALL PAGES(2,6,JP)
      IF (JP.NE.0) GO TO 4
      IF (ISL.GT.0) WRITE (6,1001) ISL,IGT,IEM,XGUN,YGUN,ZGUN,CIRCLE
      IF (ISL.EQ.0) WRITE (6,1030)
      WRITE (6,1040)
    4 WRITE (6,1042) PT,PK
      RETURN
 1001 FORMAT(*-PK AS A FUNCTION OF ASPECT SECTOR AND IMPACT SPEED.*,
     1     5X*LOC*,I4,5X*GT*,I2,5X*EM*,I2,5X*X*,F7.0,3X*Y*,F7.0,3X*Z*,
     2     F7.0,5X*RADIUS*,F5.0,* M*)
 1030 FORMAT(*-TOTAL PK FOR DENSITY CLASS 1 AS A FUNCTION OF ASPECT*,
     1     * SECTOR AND IMPACT SPEED.*)
 1040 FORMAT(*0SECTOR   AZIMUTH    ELEV.*,8X*0-152      152-305      *,
     1     *305-457      457-610      610-762      762-914      914-1067*,
     2     3X*1067-1219       TOTAL PK* / 9X*REAR=00  DOWN=00*)
 1041 FORMAT(I7,2X,A7,2X,A7,8F12.7,F14.7)
 1042 FORMAT(1H0,18X*TOTALS*,8F12.7,F14.7)
      END
      SUBROUTINE TPLOT(NFPA)
C
```

```
C     PLOTS X VS. Y AND X VS. Z ON PRINTER FOR EACH FLIGHT PATH.
C          NO PLOT WHEN XMAX-XMIN IS LESS THAN 50.
C
      COMMON  XFPA(1201), YFPA(1201), ZFPA(1201),
     1         BFPA(1201), AFPA(1201), PFPA(1201),
     2        VXFPA(1201),VYFPA(1201),VZFPA(1201)
      DIMENSION PLOT(111)
      LOGICAL XA
      DATA BLANK,YAXIS,XAXIS,POINT/1H ,1H:,1H-,1H+/
C     PLOT ONLY ABOUT 50 POINTS WITH "IFPA".
      IFPA = MAX0(NFPA/50,1)
C     FIND MIN-MAX VALUES OF X, Y, AND Z (ZMIN = 0. BY DEFN.)
      XMIN = YMIN = 1.E99
      XMAX = YMAX = ZMAX = -1.E99
      DO 100 I=1,NFPA,IFPA
      XMIN = AMIN1(XMIN,XFPA(I))
      YMIN = AMIN1(YMIN,YFPA(I))
      XMAX = AMAX1(XMAX,XFPA(I))
      YMAX = AMAX1(YMAX,YFPA(I))
  100 ZMAX = AMAX1(ZMAX,ZFPA(I))
C     CHECK X RANGE TO AVOID FUNNY X-Z PLOT.
      XRNG = XMAX - XMIN
      IF (XRNG .GT. 49.999) GO TO 110
      CALL PAGES(3,0,I)
      WRITE (6,210)
      RETURN
C     SCALE X,Y TO METERS PER CHARACTER.
  110 D = AMAX1(XRNG/11.,(YMAX-YMIN)/7.25)
      DX = D/10.
      DY = D/8.
C     CENTER PLOT BY RE-CALCULATING X-Y MIN-MAX.
      XMIN = (XMAX+XMIN)/2. - 55.*DX
      YMIN = (YMAX+YMIN)/2. - 29.*DY
      XMAX = XMIN + 110.*DX
      YMAX = YMIN + 58.*DY
C     SCALE Z (NOT TO SAME SCALE AS X-Y).
      DO 120 I=1,100
      D = FLOAT(I*500)
      IF (D .GT. ZMAX) GO TO 130
  120 CONTINUE
  130 DZ = D/10.
C     SEE IF AXES SHOULD APPEAR ON PLOT.
      XA = .FALSE.
      NYA = -10
      IF (XMIN .LE. 0. .AND. XMAX .GE. 0.) XA = .TRUE.
      IF (YMIN .LE. 0. .AND. YMAX .GE. 0.) NYA = 59 - INT(0.5-YMIN/DY)
      IF (XA) NXA = 1 + INT(0.5-XMIN/DX)
C     SET 8 LINES PER INCH SPACING ON PRINTER.
```

```
      WRITE (6,280)
C     SET PAGE CONTROL, PLOT X-Z, THEN X-Y.
      CALL PAGES(56,0,I)
      WRITE (6,250)
      WRITE (6,220)
      IFPA = 2 * IFPA
      DC 160 K=1,11
      DO 140 I=1,111
      PLOT(I) = BLANK
  140 IF (K.EQ.11) PLOT(I)=XAXIS
      IF (XA .AND. K.NE.11) PLOT(NXA) = YAXIS
      Z = FLOAT(11-K)*DZ
      DO 150 I=1,NFPA,IFPA
      IX = 1+INT(0.5+(XFPA(I)-XMIN)/DX)
  150 IF (K .EQ. 11-INT(0.5+ZFPA(I)/DZ)) PLOT(IX) = POINT
  160 WRITE (6,230) PLOT,Z
      WRITE (6,220)
      WRITE (6,250)
      WRITE (6,22C)
      IFPA = IFPA/2
      DO 190 K=1,59
      DO 170 I=1,111
      PLOT(I) = BLANK
  170 IF (K .EQ. NYA) PLOT (I) = XAXIS
      IF (XA) PLOT(NXA) = YAXIS
      Y = YMIN + FLOAT(59-K)*DY
      DO 180 I=1,NFPA,IFPA
      IX = 1 + INT(0.5+(XFPA(I)-XMIN)/DX)
  180 IF (K .EQ. 59-INT(0.5+(YFPA(I)-YMIN)/DY)) PLOT(IX) = POINT
      I = MOD(K,2)
      IF (I.NE.1) WRITE (6,240) PLOT
  190 IF (I.EQ.1) WRITE (6,260) PLOT,Y
      WRITE (6,220)
      WRITE (6,250)
C     PRINT X AXIS VALUES.
      D=10.*DX
      DC 200 I=1,12
  200 PLOT(I) = XMIN + D*FLOAT(I-1)
      WRITE (6,270) (PLOT(I),I=1,12),DX,DY
C     RE-SET PRINTER SPACING BACK TO 6 LINES PER INCH.
      WRITE (6,290)
      RETURN
  210 FORMAT(*ONEARLY CONSTANT X IN FLIGHT PATH.  NC PLOT PRINTED.*/)
  220 FORMAT(1X,113(1H*))
  230 FORMAT(2H *,111A1,1H*,3X*Z =*,F8.1,* M*)
  240 FORMAT(2H *,111A1,1H*)
  250 FORMAT(2X*A*, 9X*B*, 9X*C*, 9X*D*, 9X*E*, 9X*F*,
     1         9X*G*, 9X*H*, 9X*I*, 9X*J*, 9X*K*, 9X*L*)
```

```
260 FORMAT(2H *,111A1,1H*,3X*Y =*,F8.1,* M*)
270 FORMAT(*0X(A)=*,F8.1,* M*,4X*X(B)=*,F8.1,* M*,4X*X(C)=*,F8.1,* M*,
   1       4X*X(D)=*,F8.1,* M*,4X*X(E)=*,F8.1,* M*,4X*X(F)=*,F8.1,* M*,
   2       4X*X(G)=*,F8.1,* M*/1X*X(H)=*,F8.1,* M*,4X*X(I)=*,F8.1,* M*,
   3       4X*X(J)=*,F8.1,* M*,4X*X(K)=*,F8.1,* M*,4X*X(L)=*,F8.1,* M*,
   4       4X* DX =*,F8.1,* M*,4X* DY =*,F8.1,* M*)
280 FORMAT(1HT)
290 FORMAT(1HS)
    END
    SUBROUTINE RPLANE(T)
C
C     COMPUTES INFORMATION ABOUT THE POSITION OF THE AIRCRAFT AT TIME =T
C
    COMMON/BLOCK2/NFPA,TMIN,TMAX,DTFPA
    COMMON/BLOCK3/XGUN,YGUN,ZGUN
    COMMON/NFPARM/XA,YA,ZA,RA2,RA,TIME
    COMMON/IGXGYG/IG,XG(8),YG(8)
    COMMON  XFPA(1201),YFPA(1201),ZFPA(1201),BFPA(1201),AFPA(1201),
   1        PFPA(1201),VXFPA(1201),VYFPA(1201),VZFPA(1201)
    COMMON/CECM1/IRECM,IJ,GAINJ,IX,XSEC,CALX,PJW,
   *        X,Y,Z,ROL,PIT,HDG,
   *         FTGT,FJAM,GJ,SJT,SN
    CALL INTERP((T+TIME)/DTFPA)
    XA=GETVAL(XFPA)-XGUN-XG(IG)
    YA=GETVAL(YFPA)-YGUN-YG(IG)
    ZA=GETVAL(ZFPA)-ZGUN
    RA2=XA*XA+YA*YA+ZA*ZA
    RA=SQRT(RA2)
    RETURN
    END
    FUNCTION ANGLIM(X)
C
C     LIMITS ANGLES TO PRINCIPAL ANGLES BETWEEN -PI AND +PI
C
    COMMON /CONSTS/ DEGREE,RADIAN,PI,PI2,QTRPI,SQRT2
    IF(ABS(X)-PI)1,1,2
  1 ANGLIM=X
    RETURN
  2 ANGLIM=X-PI2*FLOAT(IFIX((X+SIGN(PI,X))/PI2))
    RETURN
    END
    FUNCTION RSHELL(T)
C
C     COMPUTES RANGE TO SHELL AT TIME = T
C
    COMMON/VSASBS/VMUZZ,ASHCON,BSHCON,CQUAD
    DQUAD=1.0+T*(ASHCON+T*BSHCON)
    RSHELL=T*VMUZZ/DQUAD
```

```
      RETURN
      END
      FUNCTION VSHELL(T)
C
C     CCMPUTES SPEED OF SHELL AT TIME=T.  CAN ONLY BE USED AFTER A CALL
C     TO RSHELL AT THE SAME TIME, SINCE RSHELL COMPUTES DQUAD FOR VSHELL
C
      COMMON/VSASBS/VMUZZ,ASHCON,BSHCON,CQUAD
      VSHELL=VMUZZ*(1.0-BSHCON*T*T)/(DQUAD*DQUAD)
      RETURN
      END
      SLBROUTINE INTERP(FINT)
C
C     SETS CONSTANTS (FRACT, INDEX1, ANC INDEX2) FOR TWO PGINT INTER-
C      FOLATION
C
      CCMMON/MAGIC/FRACT,INDEX1,INDEX2
      INDEX1=FINT
      FRACT=FINT-FLOAT(INDEX1)
      INDEX1=INDEX1+1
      INDEX2=INDEX1+1
      RETURN
      END
      FUNCTION GETVAL(ARRAY)
C
C     PERFORMS TWC POINT INTERPOLATION
C
      CCMMON/MAGIC/FRACT,INDEX1,INDEX2
      DIMENSION ARRAY(1201)
      GETVAL=ARRAY(INDEX1)+FRACT*(ARRAY(INDEX2)-ARRAY(INDEX1))
      RETURN
      END
      BLOCK DATA
      CCMMON /BLOCK1/  ITITLE(10)
      COMMON /BLOCK3/  XGUN,YGUN,ZGUN
      CCMMON /BLOCK4/  IGT,IEM,ICB,ISB,IGL,CIRCLE
      COMMON /BLOCK5/  NRHOS,RHO(9)
      COMMON /BLOCK6/  NTINTS,TINTER(10)
      CCMMON /BLOCK7/  IVACOM(8),VAT(9,5,9)
      COMMON /BLOCK8/  TREACT,TRACK1,TRACK2
      CCMMON /BLOCK9/  TROUND(6),THDMAX(6),PHDMAX(6),PHIMIN(6),PHIMAX(6),
     1                 VELMIN(6),VELMAX(6),RANMIN(6),RANMAX(6),ATLAG(6),
     2                 ETHMAX(6),EPHMAX(6),RMODES(6)
      CCMMON /BLOCKA/  TFMAX1(6),TFMAX2(6),RVACON(6),RVBCON(6),VMUZEL(6)
      COMMON /CONSTS/  DEGREE,RADIAN,PI,FI2,QTRPI,SQRT2
      CCMMON /HEADFO/  LINE,NUMBER
      COMMON /BUDGET/  BDACON(6)
C     VALUES ON "ASIDOC" CARDS FROM A.S.I. DOCUMENTATION DRAFT.     (BEE)
```

```
      DATA ATLAG  /2*9999.99,1.33,9999.99,2*1.33/
      DATA BDACON /.00265,.00501,.0031,.00697,.00113,.00113/
      CATA DEGREE /57.2957795130082/,   RACIAN/0.01745329251994/
      DATA EPHMAX /6*.1/,        ETHMAX /6*.1/
      DATA IGT    /3/,   IEM/4/,   ICB/1/,   ISB/4/,   IGL/1/,   CIRCLE/0./
      DATA ITITLE /7*(1H ),10H  ASD/XROA,1H ,1H /
      DATA IVACOM /8*(1H )/
      DATA LINE   /66/,   NUMBER/0/
      DATA NRHOS  /9/
      DATA NTINTS /10/
      DATA PHDMAX /.43633,.43633,.78540,.34910,.31416,.3491/
      DATA PHIMAX /1.48353,1.57079,1.48353,1.48353,1.51844,1.43117/
      DATA PHIMIN /-.17453,-.14835,-.17453,-.08727,-.06981,-.05236/
      CATA PI     /3.14159265358981/,   PI2/6.28318530717961/
      DATA QTRPI  /0.785398163397451/
      DATA RANMAX /3000.,3000.,3300.,5000.,5500.,99999./
      DATA RANMIN /0.0,400.,500.,0.,0.,99999./
      DATA RHO    /1.,.5,.3333333333,.25,.2,.1666666666,.1,.02,.01/
      DATA RMODES /-1.,-1.,400.,-1.,1500.,0.0/
      DATA RVACON /.180209,.251499,.22998,.089321,.07845,.050694/
      DATA RVBCON /.012392,-.006259,-.006889,.004262,-.000421,-.000357/
      DATA SQRT2  /1.41421356237311/
C     TFMAX CARDS PROVIDE EXACT AGREEMENT WITH AFATL PRCGRAM ON TEST
C         CASE, BUT NOT EXACT VALUES FCR MAX RANGE.    13 FEB 73    (BEE)
      CATA TFMAX1 /1.6,2.2,3.8,4.1,6.2,99.99/
      CATA TFMAX2 /99.99,99.99,7.5,99.99,11.6,19.2/
      DATA THDMAX /0.5236,.5236,1.39626,0.52360,.5236,.5236/
      DATA TINTER /10.,20.,30.,40.,50.,60.,70.,80.,90.,999.99/
      DATA TREACT /0./,   TRACK1/2.5/,   TRACK2/6.0/
      CATA TROUND /.75,.4,.2,.75,.857,4./
      DATA VAT    /405*0./
      DATA VELMAX /300.,300.,350.,250.,300.,999.9/
      DATA VELMIN /0.,0.,0.,0.,0.,999.9/
      DATA VMUZEL /840.,1000.,930.,880.,960.0,800./
      DATA XGUN   /0./
      DATA YGUN   /0./
      DATA ZGUN   /0./
      END
      SLBROUTINE AVG(ITST,IPRINT,ISW)
      DIMENSION IPRINT(6)
      DATA IBLNK,SUM,CNT/2H  ,0.0,0.0/
      DATA IALL/2HAL/
      CECODE(10,900,IPRINT(1)) PK
  900 FORMAT(F10.7)
      DECODE(7,910,IPRINT(4)) YGUN
  910 FORMAT(F7.0)
      IF(ISW.EQ.IALL) GOTO 600
      IF(ITST.EQ.IBLNK) GOTO 200
```

```
      IF(YGUN.NE.0.0) GOTO 150
      CNT=CNT+0.5
      SUM=SUM+PK/2.
      POLD=0.0
      GOTO 500
150   CONTINUE
      CNT=CNT+1.0
      SUM=SUM+PK
      POLD=PK
      GOTO 500
200   IF(CNT.LE.0.5) GOTO 500
      CNT=CNT-0.5
      SUM=SUM-POLD/2.0
201   AVERG=SUM/CNT
      WRITE(6,800) CNT,AVERG
  800 FORMAT(/5X,18HAVERAGE P(KILL) ON,F6.1,20H OFFSET LOCATIONS IS,
     X       F10.7/)
      SUM=0.0
      CNT=0.0
  500 RETURN
600   IF(ITST.NE.IBLNK) GOTO 610
      IF(CNT.NE.0.0) GOTO 201
      GOTO 500
610   SUM=SUM+PK
      CNT=CNT+1.0
      GOTO 500
      END
      SUBROUTINE MULPTH(I,REFC,EL,BIAS,SC2)
      DIMENSION C(3),S(3),B(3)
      DATA
     * AK/-0.6931471806/
     *,SQRT2/1.414213562/
     *,B/0.0244346,0.0314159,0.0785398/
     *,C/0.0132557,0.0185345,0.0478558/
     *,S/0.00872665,0.0104720,0.0244346/
      BW = B(I)
      CAL = C(I)
      SQ = S(I)
      DIR = EXP(AK*(SQ/BW)**2)
      EL2 = 2.*EL
      RU = EXP(AK*((EL2+SQ)/BW)**2)
      RL = EXP(AK*((EL2-SQ)/BW)**2)
      DRU1S = (DIR+REFC*RU)**2
      DRU2S = (DIR-REFC*RU)**2
      DRL1S = (DIR+REFC*RL)**2
      DRL2S = (DIR-REFC*RL)**2
      DIF1 = (DRU1S-DRL1S)
      SUM1 = (DRU1S+DRL1S)
```

```
      DIF2 = (DRU2S-DRL2S)
      SUM2 = (DRU2S+DRL2S)
      SIGER1 = DIF1/SUM1
      SIGER2 = DIF2/SUM2
      ANGER1 = CAL*SIGER1
      ANGER2 = CAL*SIGER2
      PPBY2 = ABS(ANGER2-ANGER1)/2.
      BIAS = ANGER1+PPBY2
      SD = PPBY2/SQRT2
      SD2 = SD*SD
      RETURN
      END
      SUBROUTINE ECM1
      DIMENSION RGDB(3),PRW(3),FREQ(3),IRTYP(4),RNOISE(3)
      DIMENSION TABJ(37,37),TABX(37,37)
      COMMON /BLOCK1/ ITITLE(10)
      COMMON /HEADFO/ LINE,NUMBER
      COMMON
     */CECM1/IRECM,IJ,GAINJ,IX,XSEC,CALX,PJW,
     *        X,Y,Z,ROL,PIT,HDG,
     *         FTGT,FJAM,GJ,SJT,SN
C
      NAMELIST/NAM1/RGDB,PRW,FREQ,IRTYP,I,RG,WL,FTGT,FJAM,PJW
      DATA
     * RGDB/40., 38.5, 28./
     *,PRW/105000., 175000.,250000./
     *,FREQ/15.1E9, 9.3805E9, 2.838E9/
     *,IRTYP/1,2,2,3/
     *,PI4/12.56637061/
     *,RNOISE/-123.0,-130.6,-132.2/
C
      I = IRTYP(IRECM)
      RG = 10.**(RGDB(I)/10.)
      WL = 2.998E8/FREQ(I)
      RN = RNOISE(I)
      FTGT = PRW(I)*RG*RG*WL*WL/PI4/PI4/PI4
      FJAM = PJW*RG*WL*WL/PI4/PI4
      CALL PAGES(3,0,JP)
      IF(IJ.EQ.0) WRITE(6,9003) GAINJ
 9003 FORMAT(//,* JAMMER ANTENNA GAIN*,F7.3,* DB*)
      IF(IJ.NE.0) WRITE(6,9004)
 9004 FORMAT(//,* JAMMER TABLE SPECIFIED*)
      CALL PAGES(3,0,JP)
      IF(IX.EQ.0) WRITE(6,9005) XSEC
 9005 FORMAT(//,* AIRCRAFT CROSS SECTION *,F9.2,* SQ.METERS*)
      IF(IX.NE.0) WRITE(6,9006) CALX
 9006 FORMAT(//,* AIRCRAFT CROSS SECTION TABLE SPECIFIED. *,
     ** PRINTED VALUES WILL BE MULTIPLIED BY CALX. CALX= *,F9.2)
```

```
      IF(IJ.EQ.0) GO TO 1
C
C     JAMMER TABLE
C
      CALL TABLR(TABJ,37)
      DO 3 I=1,37
      DO 3 J=1,37
      TABJ(I,J) = 10.**(TABJ(I,J)/10.)
    3 CONTINUE
    1 GJ = 10.**(GAINJ/10.)
      IF(IX.EQ.0) GO TO 2
C
C     X-SECTION TABLE
C
      CALL TABLR(TABX,37)
    2 RETURN
C
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
C
      ENTRY ECM2
C
      NAMELIST/NAM2/ X,Y,Z,ROL,PIT,HDG,
     *CX1,CY1,CZ1,CX2,CY2,CZ2,AZ,EL,GAINJ,XSEC,D2,SJ,ST,SJT
     *,GJ
C
      IF(IX.EQ.0 .AND. IJ.EQ.0) GO TO 5
      CALL DIRCOS(X,Y,Z,0.,0.,0.,CX1,CY1,CZ1)
      CALL CARROT(CX1,CY1,CZ1,ROL,PIT,HDG,CX2,CY2,CZ2)
      CALL RECSPH(CX2,CY2,CZ2,AZ,EL)
      IF(IJ.EQ.0) GO TO 6
      CALL INTRP(TABJ,AZ,EL,37,GJ)
    6 IF(IX.EQ.0) GO TO 5
      CALL INTRP(TABX,AZ,EL,37,XSEC)
      XSEC = XSEC*CALX
    5 D2 = DIST2(X,Y,Z,0.,0.,0.)
      SJ = FJAM*GJ/D2
      ST = FTGT*XSEC/D2/D2
      SN = 10.*ALOG10(ST)-RN
      SJT = 10.*ALOG10(SJ/ST)
      RETURN
      END
      SUBROUTINE JAMER2(IRAD,AJS,SDSQ)
      DIMENSION AJS1(3),SD1(3)
      DIMENSION AJS2(4),SD2(4)
      DIMENSION AJS3(2),SD3(2)
      DIMENSION AJS4(4),SD4(4)
      GO TO (1,2,3,4),IRAD
      DATA
```

```
      * N1/3/
      *,AJS1/ -5., 6., 9./
      *,SD1/ 0.002963, 0.01185, 0.1374 /
    1 CALL INT2(N1,AJS1,SD1,AJS,SD)
      GC TO 5
      DATA
      * N2/4/
      *,AJS2/ -2., 6., 10., 16./
      *,SD2/ 0.002963, 0.009877, 0.08278, 0.1374 /
    2 CALL INT2(N2,AJS2,SD2,AJS,SD)
      GC TO 5
      DATA
      * N3/2/
      *,AJS3/15., 30./
      *,SD3/ 0.0018, 0.01441 /
    3 CALL INT2(N3,AJS3,SD3,AJS,SD)
      GO TO 5
      DATA
      * N4/4/
      *,AJS4/ -2., 6., 10., 16./
      *,SD4/ 0.006914, 0.02173, 0.1024, 0.1374 /
    4 CALL INT2(N4,AJS4,SD4,AJS,SD)
    5 SDSQ = SD*SD
      RETURN
      END
      SUBROUTINE INT2(NVAL,X,Y,XVAL,YVAL)
      DIMENSION X(NVAL),Y(NVAL)
      YVAL = Y(1)
      IF(X(1)-XVAL) 4,4,3
    4 DO 1 I=1,NVAL
      IF(X(I)-XVAL) 1,1,2
    1 CONTINUE
      YVAL = Y(NVAL)
      GO TO 3
    2 YVAL = Y(I-1) + (Y(I)-Y(I-1)) / (X(I)-X(I-1)) * (XVAL-X(I-1))
    3 RETURN
      END
      SUBROUTINE JAMER1(PLEN,SDSQ)
      SDR = PLEN*0.6826/2.*2.998E8
      SDSQ = SDR*SDR
      RETURN
      END
      SUBROUTINE TABLR(TABX,IDIM)
C
C SUBROUTINE TO READ AND PRINT A TABLE OF UP TO 37 X 37 ELEMENTS
C THE PROGRAM PROVIDES A DEFAULT VALUE FOR ELEMENTS OUTSIDE THE
C DEFINED TABLE.
C             INPUTS ARE:
```

```
C CARD  VARIABLE  FORMAT  DEFINITION
C  1       INAME    8A10   ARBITRARY IDENTIFICATION
C  2        NAZ      I5    NO. OF AZ ELEMENTS
C                          (ASSUMING ELEMENT 1 CORRESPONDS TO AZ=0)
C           NEL      I5    NO. OF EL ELEMENTS,EL GOES-ELEND TO +ELEND
C          ELEND    F10.4  MAXIMUM ENTRY EL(DEG)
C          AZEND    F10.4  MAXIMUM ENTRY AZ(DEG)
C          DEFALT   F10.4  DEFAULT VALUE
C 3+  TABX(IDIM,1) 8F10.0 DATA TABLE
C
      COMMON/TABLES/ELO,DELAZ,DELEL,JEL
      DIMENSION TABX(IDIM,1),INAME(8)
      DATA LE,LZ/2HEL,2HAZ/
      DATA AZO,CDTR/0.,.0174533/
      READ(5,98) INAME
      READ(5,99) NAZ,NEL,ELEND,AZEND,DEFALT
   98 FORMAT(8A10)
   99 FORMAT(2I5,3F10.4)
C NOTE IMPLIED INCREMENT
      DELAZ=AZEND/(NAZ-1)
      DELEL=(2.*ELEND)/(NEL-1)
C LOCATE FIRST ELEVATION ENTRY ETC
      JEL=(IDIM-NEL)/2 +1
      MEL=JEL+NEL-1
      ELO=-ELEND
      WRITE(6,101)INAME,NAZ,AZO,AZEND,DELAZ,
     1LZ,NEL,ELO,ELEND,DELEL,LE,DEFALT
  101 FORMAT(*1  TABLE DATA*,/,1X,8A10,/,2(1X,I5,
     1* ELEMENTS FROM *,F10.2,* TO *,F10.2,* BY *
     2F10.2,2X,A2,/),* ELSEWHERE TABLE IS *,F10.2)
C INSERT DEFAULT
      MAZ=(180./DELAZ)+1
      IF ((MAZ.GT.37).OR.(MEL.GT.37)) GO TO 999
      DO 8 IAZ=1,MAZ
      DO 8 IEL=1,IDIM
    8 TABX(IEL,IAZ)=DEFALT
C READ TABLE
      DO 14 I=JEL,MEL
      READ(5,102) (TABX(I,J),J=1,NAZ)
   14 CONTINUE
  102 FORMAT(8F10.0)
      IDELAZ=DELAZ
      NPAGE=NAZ/13+1
      DO 20 LP=1,NPAGE
      JH1=(LP-1)*13*IDELAZ
      JH2=JH1+12*IDELAZ
      KH1=(LP-1)*13+1
      KH2=KH1+12
```

```
      IF(LP.EQ.NPAGE)KH2=MAZ
      IF(LP.EQ.NPAGE)JH2=180
      WRITE(6,106)(JH,JH=JH1,JH2,IDELAZ)
  106 FORMAT(*1   RCS MATRIX*,/,*    ELEV *,13I9)
      JELO=MAX0(JEL-1,1)
      MELO=MIN0(MEL+1,ICIM)
      ELPT=ELO-DELEL*(JEL-JELO)
C PRINT TABLE
      DO 15 J=JELO,MELO
      WRITE(6,104)ELPT,(TABX(J,K),K=KH1,KH2)
  104 FORMAT(1X,F7.1,2X,13F9.2)
      ELPT=ELPT+DELEL
   15 CONTINUE
   20 CONTINUE
C CONVERT TO RADIANS
      DELEL=DELEL*CDTR
      DELAZ=DELAZ*CDTR
      ELO=ELO*CDTR
      RETURN
  999 CONTINUE
      WRITE(6,105)
  105 FORMAT(* >>>> ERROR IN INPUT <<<<*)
      STOP
      END
      SUBROUTINE CIRCOS(X1,Y1,Z1,X2,Y2,Z2,COSA,COSB,COSG)
      XD = X2-X1
      YD = Y2-Y1
      ZD = Z2-Z1
      D = SQRT(XD*XD+YD*YD+ZD*ZD)
      COSA = XD/D
      COSB = YD/D
      COSG = ZD/D
      RETURN
      END
      SUBROUTINE CARROT(X1,Y1,Z1,ROL,PIT,HDG,X2,Y2,Z2)
C CARROT CARTESIAN ROTATION
C HEADING
      X =  X1*COS(HDG)    +    Y1*SIN(HDG)
      Y = -X1*SIN(HDG)    +    Y1*COS(HDG)
      Z =                                            Z1
C PITCH
      XX =  X*COS(PIT)                               -Z*SIN(PIT)
      YY =                      Y
      ZZ =   X*SIN(PIT)    +                          Z*COS(PIT)
C ROLL
      X2 =  XX
      Y2 =                      YY*COS(ROL)    +    ZZ*SIN(ROL)
      Z2 =  -YY*SIN(ROL)    +    ZZ*COS(ROL)
```

```
RETURN
END
SUBROUTINE RECSPH(X,Y,Z,PHI,THE)
THE = ACOS( Z/SQRT(X*X+Y*Y+Z*Z) )
THE=THE-1.5708
PHI=0.0
SB=SQRT(X*X+Y*Y)
IF(SB .NE. 0.0)PHI=X/SB
PHI=ACOS(PHI)
PHI=ABS(PHI)
RETURN
END
SUBROUTINE INTRP(TAB,AZ,EL,NVAL,VALUE)
COMMON/TABLES/ELO,DELAZ,DELEL,JEL
DIMENSION TAB(NVAL,1)
A=ABS(AZ)
E=EL
AAZ=A/DELAZ+1.
IAZ=AAZ
EEL=(E-ELO)/DELEL+JEL
IEL=EEL
IAZ=MINO(MAXO(IAZ,1),36)
IEL=MINO(MAXO(IEL,1),36)
V1=TAB( IEL, IAZ)
V2=TAB( IEL, IAZ+1)
V3=TAB( IEL+1, IAZ)
V4=TAB( IEL+1, IAZ+1)
S=AAZ-IAZ
V12=V1+(V2-V1)*S
V34=V3+(V4-V3)*S
S=EEL-IEL
VALUE=V12+(V34-V12)*S
RETURN
END
FUNCTION DIST2(X1,Y1,Z1,X2,Y2,Z2)
XD = X2-X1
YD = Y2-Y1
ZD = Z2-Z1
DIST2 = XD*XD+YD*YD+ZD*ZD
RETURN
END
```

BIBLIOGRAPHY

1. Antiaircraft Artillery Simulation Computer Program - AFTAL Program P001 Vol. I User Manual, Air Force Armament Laboratory, Eglin AFB, Florida (Joint Aircraft Attrition Program Advanced Planning Group, September 1973).

2. Antiaircraft Artillery Simulation Computer Program - AFATL Program P001 Program Update, Joint Technical Coordinating Group for Aircraft Survivability (Survivability Assessment Subgroup, April 1976).

3. M. E. Ramaccia, ATS Working Paper No. 9, Calspan Modification to Antiaircraft Artillery Simulation, AFATL Program P001 (Calspan Corporation, Buffalo, New York, 11 August 1977).

4. G. Gary Maxwell, The Development of Class Problems for a Course in Aircraft Combat Survivability (Naval Postgraduate School Master's Thesis, 1978).

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